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# USSR Report

SCIENCE AND TECHNOLOGY POLICY

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19 February 1986

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## ORGANIZATIONAL, PLANNING AND COORDINATION

### PROBLEMS OF S&T PROGRESS IN CHEMICAL INDUSTRY OUTLINED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Aug 85 p 2

[Article by Ye. Leontyeva, deputy editor for the Department of Science and Technological Progress: "Fog at the Turn. An Epilogue to the Meeting of the Expanded Collegium of the Ministry of the Chemical Industry"]

[Text] At the joint meeting of the Collegium of the Ministry of the Chemical Industry and the Presidium of the Central Committee of the sectorial trade union both the report of Minister V. Listov and the statements of many participants were, in general, self-critical. It probably could not have been otherwise following the criticism at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. It was stated at it that the Ministry of the Chemical Industry has literally become overgrown with a large number of various scientific institutions and pilot works, while in the sector, nevertheless, major shortcomings have been detected in the development of new materials and technologies.

About what materials and technologies is it a question? This was also spoken about at the conference. The present boom of small-tonnage chemistry and the production of pure and ultra-pure substances, which in many ways determine the level of modern equipment, is growing in the world. For example, drilling mud additives are greatly increasing the speeds of the sinking of wells. There are also substances which decrease the resistance of petroleum during movement through pipelines. An enormous role belongs to inhibitors: by protecting metal against corrosion, they increase the reliability and service life of machines, equipment and components. While chemists themselves need polymer additives, which improve the properties, and modern catalysts, which make it possible without capital expenditures to increase the efficiency of many technological processes. With respect to all these items the Ministry of the Chemical Industry is in debt to consumers. And not only with respect to them.

According to the predictions of scientists, whoever is able to assimilate membranes will acquire the key to the technology of the 21st century. By means of them it is possible to carry out many processes, which today require high temperatures and pressures, with the minimum expenditures of energy. Membranes are irreplaceable in medicine and the electronics, microbiological and food industries. But for the present many types of them have to be

purchased abroad. The scale of the production of modern construction plastics is also far from the needs. For example, a ton of polycarbonate is capable of saving up to 5 tons of steel. But this material to date remains a scarce item.

It is necessary to double, to treble the efforts, it was emphasized at the conference in the CPSU Central Committee, in order not to allow a lag in the decisive directions. One might have expected that the discussion at the expanded Collegium of the Ministry of the Chemical Industry would also proceed with such a precise aim. But, unfortunately, even in the report of Minister V. Listov the most urgent questions of scientific and technical progress were merely named and in fact dissolved in the large number of other problems of the development of the sector.

Perhaps, only in one thing did the reports set the tone for the entire meeting--the speakers expressed numerous complaints about sectorial science. A number of scientific research organizations were criticized for a low efficiency of developments. It was stated, for example, that at the Special Design and Technological Bureau of Catalysts, at the Scientific Research Institute of Chemistry and Technology of Cotton Cellulose and at the Norplast Scientific Production Association the return per ruble of expenditures is one-ninth as great as the average sectorial return and comes to only 0.5-0.8 ruble. The indicators of a number of other collectives are also a little better. It would seem that there is an urgent need to analyze thoroughly the state of affairs in sectorial sciences. But in the report there was no detailed analysis. While the criticism in the statements frequently reduced to commonplace declarations, of which the words of V. Antipin, chief of the Soyuzkhimplast All-Union Industrial Association, can serve as a typical example:

"It is possible to force scientists to leave for a works only under increased pressure from above."

"But what are they to do at the works?" Ye. Yegorova, chief engineer of the Leningrad Plastpolimer Sectorial Scientific Production Association, replied. "Their place is in the laboratories. If they incite researchers merely so that they would deal only with today, the sector will have no future."

To what do these diametrically opposed opinions testify? In the sector there are tens of institutes and affiliates, at which an entire army of scientists and specialists work. Research collectives of the chemical type are extensively represented in the system of the USSR Academy of Sciences, at the republic academies and at higher educational institutions. It would be possible to draw from here many promising ideas. But here is a fact which seemed symptomatic to me: they did not invite representatives of academic science to the collegium, at which the means of accelerating scientific and technical progress were discussed.

I will say more: while intending to correct the situation, it is necessary to place the stresses accurately. When they accuse scientists of the fact that their works have not been introduced, such criticism is often misdirected. The assimilation of major innovations, as a rule, requires capital

investments, the development of new equipment and the construction or renovation of works. These questions are in the competence of the all-union industrial association and the ministry. But there is an item, for which scientists are completely responsible. This is the technical level of developments. What is the situation with it?

As paradoxical as it may be, the collegium devoted almost no attention to this question of questions. But last year the commission, which was set up by the USSR State Committee for Science and Technology, gave the answer to it. Having studied in detail the activity of 14 leading scientific institutions of the Ministry of the Chemical Industry, it came to the conclusion that at the majority of them the proportion of operations, which make it possible to exceed the world level, is extremely low.

For example, at the Plastmassy Scientific Production Association the proportion of such operations comes to 3.6 percent, at the Karbonat Scientific Production Association--2.7 percent, at the All-Union Scientific Research Institute of Synthetic Fiber--1.5 percent, at the Khimvolokno Scientific Production Association--0.18 percent, at the Plastik Scientific Production Association--only 0.15 percent. While at the All-Union Scientific Research Institute of Electroceramics there were no leading operations at all. Much research ends with results which are lower than both the world and domestic level.

The conclusions of the commission did not produce the desired effect.

Why was sectorial science not at its best?

"The management of science in the sector does not satisfy the present requirements," V. Rostunov stated at the collegium.

It was strange to hear these words from the chief of an administration for science and technology. But, as it turned out, they were spoken not unintentionally. Only one institute--the Physical Chemistry Institute imeni L. Ya. Karpov--is directly subordinate to the administration. It carries out the scientific methods supervision of the others, since they are distributed among all-union industrial associations. Such subordination should have brought sectorial science closer to the needs of production. But the managers of the all-union industrial associations perceived their rights in a peculiar manner.

For example, at the Soyuztekhnagaz All-Union Industrial Association there are 10 scientific research and planning and design organizations for 9 specialized enterprises. But the majority of their subdivisions, as it was found out at the collegium, work not for the sector and even not for the subsector, but are performing the role of fire brigades which eliminated the "bottlenecks" at enterprises. The all-union industrial associations are also using scientific forces no less extensively as an appendage to their offices, permitting the institutes to set up for this numerous divisions of the scientific organization of labor, economics and information.

As a result, the dangerous redistribution of duties, precisely about which Ye. Yegorova, chief engineer of the Plastpolimer Sectorial Scientific Production Association, also spoke, occurred in the sector. The plant laboratories, which previously in chemistry played the role of plenipotentiaries of everything new, have actually dissolved in other services of enterprises and in the concerns about the fulfillment of the plan. While their functions were transferred to sectorial scientific research institutes, which were busy with minor, current problems of production and had relaxed the search for promising directions, which guarantees progress of the sector.

"When we now suggest to staff members of institutes that they undertake research work," I. Besfamilnyy deputy chief of the administration for science and technology, laments, "some of them look at us with bewilderment: we, they say, must help the plants cope with the plan."

I also had occasion to hear similar confessions from other workers of the administration. "Our influence on all-union industrial associations and their institutes is small," they said. An aloofness and the aspiration to free oneself of the responsibility for the results of sectorial science were already sensed in the very phrase "their institutes."

Let us assume that the administration for science and technology is not capable of influencing the content of the plans of all scientific research institutes, design bureaus and scientific production associations and the progress of the work on all the numerous themes. But the immediate duty of the workers of the administration is to keep under control if only the main directions, to react to the end results, to raise questions before the management of the ministry in case of the slightest symptoms of lagging and to deal with the improvement of the network and structure of scientific institutions. But they preferred to hold aloof from them.

"We have repeatedly criticized the executives of the administration for the poor monitoring of the activity of the institutes," V. Listov noted in the report. "But, unfortunately, the criticism did not produce the desired effect."

What did the executives of the Ministry of the Chemical Industry undertake in this situation? The answer to this question was also in the report of the minister:

"It was necessary to change the curators--my deputies. Now First Deputy Minister L. Osipenko is responsible for the administration of science and technology. But the state of affairs has not changed."

I do not believe that the executives of the sector are powerless "to manage" their own administration. Rather this confession testifies that in the Ministry of the Chemical Industry the questions of the acceleration of scientific and technical progress were not in the forefront. The pace of the assimilation of scientific achievements is confirmation of this. Of the 1,200 developments, which had been completed by the start of the current five-year plan, today only 400 have been used. While the remaining 800 are simply waiting for their hour. It is hardly possible to accept unconditionally the

references to the lack of allocations. For example, the commission of the USSR State Committee for Science and Technology established that of the assets, which were allocated for the development of pilot and pilot industrial plants, the Ministry of the Chemical Industry in 3 years of the five-year plan has assimilated less than two-thirds.

Now the workers of the ministry are agreeing that the plans of scientific research and development were chronically not coordinated with plans of the designing, capital construction and renovation of works. As a result pretty often operations were brought up more or less successfully to test runs. But then they hung in mid-air. In essence this means that sectorial science did not have clear reference points to which it was obliged to bring production.

The collegium obliged First Deputy Minister L. Osipenko within a month to carry out the coordination of the separate plans. If it is possible to accomplish this in such a short time, one would like to know, why did they not do it earlier? Is it not because in the plans for the coming five-year plan the staff of the sector was oriented toward a sluggish rate of technical progress? Now, following the criticism at the conference in the CPSU Central Committee, it was necessary to revise without delay both the plans and the strategy. But this proved to be a difficult matter.

"Give me practical suggestions," the minister kept on demanding, when the speakers attempted to get off with general phrases like "it is time to consider," "thorough reorganization is required," "serious changes are needed."

Suggestions, of course, were made. But many of them bore the stamp of haste, it was sensed that far from everyone was prepared to evaluate in the new way their own work and the situation in the sector. While some openly dreaded the coming changes. For example, A. Ivchenko, director of the Orgsteklo Association, actively fought for the preservation of all-union industrial associations, to which, he said, it is easier "to knock until one gains access" than to the management of the ministry. Apparently, he had not become accustomed to acting independently.

Many of those who spoke seized like a life buoy the suggestion to set up new scientific production associations. The idea in itself is incontestable. But how will it be implemented? What kind of scientific production associations is it necessary to set up? On what basis? With what tasks and time of fulfillment? The collegium did not give an answer to these questions. But it is needed, since among the collectives, in which today the level of research and development is extremely low, there are many precisely scientific production associations. Hence, when forming new scientific production associations, it is necessary first of all to create for them the conditions for successful work and to specify clearly the ultimate goals.

In this connection the statement of V. Titov, general director of the NIOPIK Scientific Production Association, who revealed many of the causes of the disruptions in the area of small-tonnage chemistry, is interesting:

"In order to develop and assimilate in good time new substances and materials, all the organization of operations should be mobile," he said. "But we are continuing to live according to the norms of 'large-scale' chemistry. We have the same times of the designing and development of new works, the same evaluation of activity 'according to the gross,' the same procedure of stimulation. As a result the most valuable product, owing to the fact that it is produced in small quantities, turns out to be unprofitable for enterprises. It is clear that they do not want to be concerned with it."

The thought automatically arose: perhaps, the series output of small-tonnage products should also be assigned precisely to scientific production associations. But, as it turned out, there had already been such suggestions. Among others the NIOPIK Scientific Production Association had sent them to the ministry and the USSR State Committee for Science and Technology. They have already been considered in the committee. But the workers of the ministry so far have not gotten around to reacting to them.

As conceived, the meeting of the expanded Collegium of the Ministry of the Chemical Industry should have become a turning point in the development of the sector. But will a truly sharp turn be made? For the present it is merely possible to say that many paragraphs of the decree, which was adopted at the collegium, are of an instructional nature, while the abundance of programs and measures, which it is necessary to elaborate, attests that the headquarters of the sector has not specified clearly the main directions of the acceleration of scientific and technical progress.

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## ORGANIZATION, PLANNING AND COORDINATION

### STIMULATION OF INTEREST IN INTRODUCING NEW EQUIPMENT

Moscow IZVESTIYA in Russian 15 Aug 85 p 2

[Article by Igor Karpenko under the rubric "Time. Economics. Man": "The New Machine"; passages rendered in all capital letters printed in boldface in source]

[Text] How Is Equipment to Be Introduced?

Who needs a new machine? Indeed, who? The state, of course, society, each of us, in the end. However, in life it is not always possible to unite fundamentally the interests of society as a whole with the interests of specific production units. And then the question: Who needs a new machine? proves to be not at all idle.

We have become accustomed to seeing at the gate of an enterprise the standard billboard: "Wanted... and further a long list--lathe operators, mechanics, electricians, laborers...." But it has hardly happened to anyone to encounter the advertisement "wanted a new machine, technology, materials." Why? This in the end is the same thing: a new technology or machine would save the plant from the search for such scarce workers. However, a fact remains a fact: new workers are wanted, but machines.... Far from every director even in words is willing to produce or use new machines.

In the past quarter of a century there has not been one five-year or annual plan, in which they did not give technical progress its due. But here is a remarkable circumstance--during the same years the plan on new equipment was not fulfilled once. Neither the five-year nor the annual nor the quarterly plan. In the summaries of the Central Statistical Administration the sparse information on this inevitably appears in the concluding paragraphs, after the diplomatic "in addition to that".

In the search for an answer, which explains such an obvious contradiction between word and deed, let us turn to the analysis of the practice of the INTRODUCTION of what is new. Our mighty language reveals astonishingly accurately by the very sound of the word the essence of the phenomenon, as if lighting up its inner sense. This "introduction" obviously presumes someone's resistance or counteraction.

Many people have had occasion to encounter the obvious reluctance to assimilate new equipment. It is not necessary to go far for examples.

During the last four five-year plans IZVESTIYA has unsuccessfully attempted to promote the introduction of two innovations which are exceptionally important for the national economy--electron-ion technology and an automatic drilling machine.

Here is a brief excerpt from the documents of the recent conference in the USSR State Committee for Science and Technology, which has acted, incidentally, for nearly 30 years as the coordinator of the work on electron-ion technology: "The forecasting studies in just three directions--electric painting, electrostatic separation and electric gas cleaning--show that the introduction of the new technology can yield an annual economic impact for the extent of use in 1980 of more than 2 billion rubles and in 1990 about 5-6 billion rubles."

Concerning the automatic drilling machine. The fact that the decline of the growth rate of petroleum production is due mainly to the inadequate amount of drilling and obsolete drilling equipment, is becoming more and more obvious. However, the series production of the automatic drilling machine, which promised to increase by twofold the labor productivity of the driller, which was "scheduled" by years back during the 10th Five-Year Plan, was never begun.

Those wanting to take the billions, which the electron-ion technology gave, were not found, the drilling rig was not "introduced"--those, who are obliged to produce them, for 20 years now have been making, as they say, their last stand, defending their right to produce obsolete equipment. The tens of critical statements of newspapers and the direct accusals of specific people of slavery to routine, red tape and the reluctance to fulfill their duties did not help. Following such articles conferences were convened (at times at the level of ministers), lengthy decisions were adopted, and paper measures were elaborated. But things did not get moving. With the years in the ministry-newspaper war its own anecdotal strategy was developed: the deputy ministers signed the responses to the editorial offices in turns--thus the semblance of the moral right not to be responsible for last year's promises of its own collegium was created.

A paradoxical situation formed--the plants of drilling equipment are being kept as busy as possible with the output of obsolete machine tools, there are not enough of them, they are selling like hot cakes. The production of new, more efficient equipment could eliminate such overloading--then instead of two or three machine tools it would be possible to produce one. The Uralmash Plant once found the opportunity to produce a prototype of an automatic drilling machine and even became the coauthor of this promising development. But, unfortunately, the machine, which was produced back in early 1975 and which could, in the opinion of specialists, bring domestic drilling equipment up to the world level, thus remained in a single prototype.

The main reason for the 20 years of red tape with the drilling rig is the indifference of its basic users--the ministries of the petroleum and gas industries, which the extensive means of development and the increase of



capital investments suited more than the retooling of the sector, which requires serious efforts. Even the attempt to wheedle from the gas industry workers a vacant plant frame of a building in Leningrad, which at a certain stage could have accelerated the changeover to the series production of the automatic machine, proved to be unsuccessful. Incidentally, this building to this day is also vacant and is simply falling to pieces.

And as soon as the new machine proved to be unneeded by the user, the time of its output began to be regulated by the mood, desire, or reluctance of the executives of departments, by the next critical statement of a newspaper, and so on. As a result the debugging of the machine and its bringing up to the necessary level of reliability turned out today to be a matter which is important only to the authors--the Leningrad Design Bureau for the Automation of Drilling, which does not have a material base for this.

It is characteristic that the attempts to speed up the production of the automatic machine, which were made more than once by the USSR State Planning Committee and the State Committee for Science and Technology, also proved to be unsuccessful. They were unable to force four departments (the Ministry of the Electrical Equipment Industry was specified as the main one among them) to get the introduction of the electron-ion technology moving.

Of course, the accountability for technical progress should become more strict. It is probably possible at every enterprise to find the specific perpetrator of red tape and to punish for each case of disruption. However, the well-known proverb--they choose the lesser of two evils--easily explained the persistent indifference of the overwhelming majority of managers to technical progress. The introduction of a new machine is a troublesome and risky matter, the changeover of the technology to the production of a new machine very often leads to a temporary loss of the production volume. As is known, for the upsetting of the plan they will penalize to the full extent. While the punishment for new equipment is simply incomparable to this! And it is natural that one's own, immediate, and not state interests and not the future gain the upperhand.

You will agree that it is difficult to accuse nearly every "mean statistical" director of backwardness. Obviously, it is necessary to seek not the opposing slave to routine, but the countervailing factors. There are many of them, these factors, but the main one--today everyone agrees with this--was the lack of sufficiently effective and stable economic stimuli of the introduction of new machines.

Of course, there are examples of the advanced know-how of the assimilation of new equipment. Most often you encounter them at enterprises, at which in accordance with the nature of production a significant portion of the output changes annually--a kind of "discipline of the conveyor" is in effect. It is noteworthy that such enterprises have sufficient possibilities of maneuvering, flexible technology, and a structure (usually scientific production associations), which makes it possible to carry out simultaneously scientific development, designing, and the technological preparation of production. And they also have sufficient independence and interest in the use of these possibilities. I had occasion to write several years ago about such

experience, for example, of the Leningrad Svetlana Association. However, these are exceptions which confirm the rule. And the rule, unfortunately, consists as before in the fact that the possibilities of technical progress--as statistics attest--for the present do not entice the managers of sectors and enterprises too much.

### The Stimuli of Progress

On this level an opposite example seems noteworthy: the positive experience of an entire department--the Ministry of the Electrical Equipment Industry, the successes of which in the use of new resource-saving technologies were noted at the June conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. The most promising part of this experience under the future economic conditions, for which we are preparing and which we are beginning to assimilate today--the method of the functional cost analysis (FSA)--I am confident, is especially interesting. The basic principle of this method is most simple: when designing new items and improving old ones, which have already been assimilated, each technical decision is weighed on the scale of economics and is carefully checked with respect to two items: What is being done and how much does it cost?

You will not tell about the functional cost analysis in a few words: its principles are as simple as the requirements, which envisage the most modern techniques of technical and economic research--systems analysis, the theory of the solution of inventing problems, "brainstorming," and so on--are complicated. From the standpoint of the national economic impact the functional cost analysis is an excellent form of influence on production, which in its essence ensures precisely a state approach to the end result: the output of less expensive products, as a rule, with the sharp improvement of their quality. Moreover, a mandatory requirement of the method is the closest attention to the decrease of the expenditures on operation, maintenance, and repair and even the recovery of an item after complete wearing out.

This attention to progress in this case it explained simply: both the enterprises and the entire Ministry of the Electrical Equipment Industry, for which a specific task--to provide the entire increase of the output of products without an increase of resources, by means of their saving--was set during the current five-year plan, are vitally interested in it. THE SET OF MATERIAL STIMULI WAS ALSO FORMED IN CONFORMITY WITH THIS.

It would be possible to say many fine words meant for the pioneers of the functional cost analysis. But here is the paradox: this is, after all, the very same ministry, which is responsible for the introduction of the electron technology and is quite successfully ruining the matter for the 3d decade in a row! The reason? It is not interested economically--in this case the users should receive the entire profit.

In other departments in turn the very same thing is happening with the method of the functional cost analysis. A number of organizations were charged 3 years ago by a decree of the CPSU Central Committee "to generalize the experience, which exists in the Ministry of the Electrical Equipment Industry,

of the use of the functional cost analysis as a tool of the increase of the efficiency of the use of material and manpower resources and to elaborate and implement measures on its dissemination in the national economy."

Unfortunately, it has to be stated: the method was not disseminated. It "did not suit" other ministries economically: special stimuli for the saving of resources were not envisaged for them.

"We have to carry out the new technical renovation of the national economy, to transform qualitatively the material and technical base of society. The solution of this problem is an urgent matter, a partywide and national matter," it was emphasized in the report of M. S. Gorbachev at the June conference in the CPSU Central Committee.

The need for the retooling of sectors in many ways is predetermined by the fact that many plants of our industry were built anew and reequipped during the postwar years. In the past 3 to 4 decades the potentials of such equipment have been exhausted.

The most important task of technical progress is the replacement of manual and in general human labor by machine labor. For us this aspect of it has now assumed particular importance in connection with the demographic situation: during the next few years the annual absolute increase of workers is expected to be zero. Hence, the entire development of the economy should take place by means of its intensification.

Finally, technical progress is product quality, a problem, the solution of which we can no longer put off.

For many years, when receiving new machines, technology and materials, did we ponder whether they are better or worse than the old ones? This went without saying: they are new, hence they are more productive, more efficient, and more reliable than the former ones. In the past 2 decades production, having received a machine, and you and I, having received a household appliance or consumer goods, have far from always been able to understand in what, except the price, its novelty lies. The low quality of a household appliance became the talk of the town, while its guarantee was inconspicuously transformed into the guarantee of free repair. The consumer is deprived of the opportunity to influence the change of prices, which are not connected with the corresponding increase of the quality and reliability of items. However, pricing as the most important stimulus of technical progress requires a special discussion. In this case it is a question of something else. The established tradition of producing imaginary "new things" is doubly dangerous: it creates the illusion of technical progress and consumes the assets which are necessary for truly new products.

Thus, each time the analysis of the causes of the slow introduction of new equipment inevitably leads to the conclusion: the main obstacle in the way of technical progress is the weak economic interest in it of the enterprise and the department as a whole. "Weak" is, perhaps, said too mildly: the intense work, which requires additional efforts from the entire collective, in practice is not being stimulated in any way.

The enterprise is interested least of all in the introduction of machines and technologies, which free workers. Much must be done in order to change the psychology of the manager, for whom today the first commandment is not for anything and on no account to voluntarily give up the wage fund and to agree to a decrease of the number, in conformity with which they determine today all the benefits for the enterprise, up to its category.

Many managers, apparently, recall the Shchekino and several other experiments, which stimulated the saving of living labor and outlined good changes in this direction. However, later, when the additions, corrections, and specifications reduced to naught the point of such experiments, the positions of those, who had not hastened with reorganization, merely grew stronger. In the end precisely those, who had discovered reserves and had made a search, proved to be the losers. They were left in practice with no extra people in the shops, and, when everything had returned in practice to the starting point, they were faced with difficult problems--with what and how to compensate for the more intense labor of their specialists and workers. Questions of not at all a production nature also arose: Who is to be sent (now they also require this of them) for the harvesting of potatoes, to the vegetable bases, for the emergency unloading of railroad cars and the cleaning of streets in winter? Automatic machines, robots?

Such a situation intensified noticeably the aspiration to shield production against any innovations and reforms. Therefore, the task of convincing people today of the dependability of changes is difficult and not secondary. The manager has a tenacious memory, the traditions in the economy die hard. Only the gradual development of cost accounting relations in all the units of the national economy and a thoroughly considered, efficient set of material stimuli, which are at the very basis of the economic relations of the collective and society, can change them and turn them into a benefit for technical progress.

#### The Reserves of Reorganization

About 20 years ago M. Feldman, chief economist of the Voskresensk Chemical Combine and a specialist with vast experience, proposed to me a simple formula for checking the viability and promise of any innovation: whatever is equally profitable to the enterprise, the sector, and the state, will quickly find recognition and extensive use. The breaking of any link in this chain inevitably entails difficulties of introduction and decreases the impact of the new thing.

At his enterprise, which had tested new economic conditions which stimulate technical progress, the highest product quality and labor productivity in the sector were achieved in a short time. The collective produced similar products with even a smaller number of workers than the Shchekino Combine, which is famous for its experiment in this area. Incidentally, for both collectives technical progress was the main tool of the achievement of the goal and received outstanding supply with "the human factor." AT ALL LEVELS--FROM THE WORKER TO THE DIRECTOR--PEOPLE WERE INTERESTED IN IT ECONOMICALLY.

In addition to an economic interest, real possibilities for the introduction of new equipment and a sufficient degree of independence in the creation of the reserves necessary for this are always traced in the past and current experience of the enterprises, for which technical progress actually became the main means of the intensification of production. A very important circumstance is that the resources for the fulfillment of major scientific and technical programs should be concentrated in the state, but there are no and can be no extra assets for the introduction of each innovation, reserve design bureaus, and idle capacities. For the present we are planning a shortage, and not reserves. We distribute at times to related industries products of enterprises, which do not yet exist and which frequently never go into operation on the planned date. This is being said not to recall once more the well-known miscalculations of planning. Reserves of assets and capacities insure and stimulate the search for what is new; in case of a shortage the most needed machine all the same will have to be "introduced"--it will have to be driven, squeezed into the overloaded program.

In the discussion on the sources of assets for the introduction in production of new equipment the following consideration also seems important. The search for these assets is of a one-time nature. And in essence, in case of the normal organization of the matter precisely technical progress itself should also first of all give society the assets for the implementation of its social and all other programs. It should be less expensive and more profitable for each and everyone to produce products of the highest quality, and not defective output, to use the latest technology which saves resources--past labor and the most advanced machines, which save living labor and free workers. It should be, otherwise what kind of progress is this?

At the June conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress and in the recent decree of the CPSU Central Committee and the USSR Council of Ministers "On the Extensive Dissemination of New Methods of Management and the Strengthening of Their Influence on the Acceleration of Scientific and Technical Progress" this task was indicated--to make the economy most receptive to technical progress. Specific steps for the solution of many typical problems, which were discussed in the article, were stipulated in the documents of the conference and in the decree. However, it will probably be necessary to return again and again to these problems precisely because they have been typical for quite a long time. The planning levers of the economy, which prompt people to the intensive means of the development of production, as the experience of the leaders and participants in the experiments attests, are inevitably turning the collectives toward technical progress. But even the most precise indicators and efficient stimuli of the introduction of new equipment do not have an effect in themselves. The practical implementation of the outlined measures requires daily painstaking work in each sector of the national economy and at literally every enterprise. And we must evaluate in the most principled manner both the loftiest point of this work and the difficulties, with which we might be faced here.

This work is doubly complicated--not without reason do they say that it is easier to learn than to relearn. The national economic mechanism, which was in effect for many years, created the psychology of the manager and

stereotypes of skills and thinking, which, to put it mildly, did not stimulate the introduction of what is new and advanced. The reform of the psychology of managers and the creation of an atmosphere of searching and creativity in every collective are a necessary condition of success in the strengthening of the very chain, in which technical progress is becoming equally profitable for everyone--the state, the enterprise, and every worker.

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## ORGANIZATION, PLANNING AND COORDINATION

### KAZAKH SSR WORKS TO IMPLEMENT CPSU DECREE ON S&T PROGRESS

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian Feb 85 pp 4-6

[Article under the rubric "In the Presidium of the Kazakh Academy of Sciences"]

[Text] The presidium noted that the scientific institutions of the department performed work to implement the decree of the General Meeting of the Kazakh Academy of Sciences dated 15 December 1983, "On tasks for scientists of the Kazakh Academy of Sciences to implement the decree adopted by the CPSU Central Committee and USSR Council of Ministers 'Steps to accelerate scientific and technological progress in the national economy'" and relevant decree of the Central Committee of the communist party of Kazakhstan and Kazakh Council of Ministers.

At each institute, concrete measures were developed, discussed and approved, which were aimed at strengthening scientific and practical ties with industrial enterprises and accelerated introduction to industry of scientific achievements on the basis of advance development of basic research. At the present time, 138 topics are being worked on with sectorial institutes and enterprises of more than 10 ministries and agencies of the USSR and this republic.

In the course of the year, analysis was made of plans for scientific research, experimental and experimental-industrial trials for detection of directions holding little promise and concentration of efforts on key basic and applied investigations that would provide for wise use of physical and raw materials resources, environmental protection, fulfillment of the Food and Energy programs of the USSR. Work plans were amended and the structure of the institutes was revised.

Thus, at the Institute of Chemical Sciences, the laboratory of polymerization processes was closed down in order to eliminate minor topics and intensify work in important directions. Temporary scientific research groups were formed: for chemical technology of synthesis and use of polymers and for use of mathematics in chemical investigations.

At the Institute of Metallurgy and Ore Dressing, a laboratory of physico-chemistry of vanadium was formed, which solves pressing problems of theory and



technology of processing vanadium-containing intermediate products of the metallurgical and chemical industry. In order to conduct joint work with enterprises of the Ministry of the Chemical Industry, a laboratory of catalyst technology was formed and manned with a qualified staff as part of the Institute of Organic Catalysis and Electrochemistry. The topics were revised and laboratories reorganized at the Institute of Petroleum and Natural Salts Chemistry, in particular, a laboratory of petroleum chemistry and refinery and laboratory of coagulation of petroleum dispersed systems were formed.

Attributing special significance to increasing the effectiveness of studies to implement the USSR Food Program, the department's institutes are working on 20 topics, and 30 have been proposed in the draft of the USSR Energy Program.

In 1984, scientific institutions of the department completed 18 topics referable to 2 special-purpose and 7 scientific-technical programs and 4 assignments of the USSR State Committee for Science and Technology. A total of 32 topics were included in the State Plan for Economic and Social Development of Kazakh SSR.

There was activation of work at the institutes to include priority scientific and technological programs for development. The Institute of Metallurgy and Ore Dressing has begun to prepare and write up special-purpose combined programs--Mineral Resources and Ore--other institutes of the department (Institute of Chemical Sciences and Institute of Organic Catalysis and Electrochemistry) will also participate in these programs. Drafts have been prepared of plans for joint investigations with enterprises under the Kazakh Ministry of the Chemical Industry, Ministry of Fertilizers, Ministry of Nonferrous Metallurgy and others. Concrete proposals for the "Combined Program of Scientific and Technological Progress in Kazakh SSR in 1986-2010" were submitted to the Presidium of the Kazakh Academy of Sciences.

The Experimental-Testing Metallurgical Shop (OEMTS) is at the stage of installation of equipment and apparatus that are intended for performance of technological tests. The Institute of Metallurgy and Ore Dressing is completing the installation of equipment for recovery of parts by the powder metallurgy method and for percolation leaching of phosphorus ore in Zhanatas.

The Institute of Organic Catalysis and Electrochemistry has installed at the OEMTS and accepted for operation a device for hydrogenization of organic compounds under high pressure (up to 320 atm) on stationary catalysts. Installation is in progress in Box No 5 of an experimental device for recovery of granulated alloy catalysts.

The tasks of improving efficiency of production, developing and introducing more sophisticated technological processes are being performed well. At the Irtysh Polymetal Combine, there has been assimilation of a process for melting copper-zinc concentrates in a "kivtset" [oxygen-suspension-cyclonic-electrothermal] unit. The method of melting copper concentrates in a liquid



bath underwent experimental production testing at the Balkhash Mining and Smelting Combine. Sorbtion-extraction technology for recovery of rhenium from metallurgical dust was first introduced to the lead industry (Chimkent Lead Plant), and this made it possible to organize production of brand AR-0 rhenium salts and double the output of rhenium products.

By decision of the USSR Ministry of Fertilizers, it was decided to bring production of low-temperature polyphosphate by a technology developed at the Institute of Chemical Sciences to the Dzhambul Superphosphate Plant under the 12th Five-Year Plan, and phosphorus and potassium fertilizers to all phosphorus plants in the country with the first shops being started up during the current five-year plan.

There has been activation of studies of petroleum-bituminous rock at the Institute of Petroleum and Natural Salts Chemistry. Laboratory tests have been made of different road-paving compositions based on kir [solidified petroleum] and mineral mixtures. Recommendations have been prepared on road construction in Guryev Oblast, and there have been experimental production trials of motor vehicle roads, construction of which has started.

In 1984, the department institutes handed over to industry 14 projects. They include the "New technology for augmenting extraction of high-paraffin content petroleum--stepped thermal flooding (STZ)," developed by the Institute of Petroleum and Natural Salts Chemistry, which yielded an effect in 1979-1983 in the form of additional recovery of petroleum, worth 65 million rubles, as compared to the existing system of flooding. The overall economic effect of introducing the other projects was 9.72 million rubles.

The staffs of the institutes published 7 monographs, obtained 117 author certificates and 72 approvals for the latter, 5 patents, defended 5 doctoral and 34 candidatorial dissertations on the basis of the results of their investigations.

In addition to the definite achievements of the scientific institutions of the department, there are also some flaws.

The Presidium of the Kazakh Academy of Sciences took into consideration the report on the performance of scientific institutions of the Department of Chemical and Technological Sciences with respect to implementation of measures that would be instrumental in accelerating scientific and technological progress.

The presidium made it incumbent upon the department's scientific institutions to assure further growth in effectiveness and quality of scientific research in the light of the decree of the CPSU Central Committee and USSR Council of Ministers "On steps to accelerate scientific and technological progress in the national economy" and relevant decree of the Central Committee of the Communist Party of Kazakhstan and Kazakh Council of Ministers.

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## ORGANIZATION, PLANNING AND COORDINATION

### CENTRAL ASIAN POWDER METALLURGY INSTITUTE TASKS DEFINED

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian Feb 85 pp 6-7

[Article under the rubric "In the Presidium of the Kazakh Academy of Sciences"]

[Text] The Presidium, having discussed the report of the Institute of Metallurgy and Ore Dressing--Research Center of Power Metallurgy of the Central Asian Region--observed that the Research Center has implemented combined measures for coordination of scientific research and design work in executor organizations of the region, is organizing work of the interrepublic scientific-technical council for the problem of "Powder metallurgy, composition materials and powder surfacing materials," redirected the scientific topics of the base laboratory of physicotchnical investigations at the Institute of Metallurgy and Ore Dressing of the Kazakh Academy of Sciences to powder metallurgy, established an on-the-job training section, strengthened scientific and technical ties with the leading research institutions and industrial enterprises, was instrumental in initiating use of methods of powder metallurgy and developing efficient technological processes.

The Presidium of the Kazakh Academy of Sciences, for the purpose of further development of research in the area of powder metallurgy, approved of the activities of the Research Center in the matter of setting up coordination of scientific research and experimental design work aimed at development of progressive technological processes for recovery of powder materials, their use to manufacture products, restore worn parts, apply different types of surfaces, design special equipment and determine the sectors, in which it would be expedient to use powder materials.

The following were defined as the main directions of work of the Research Center in the area of powder metallurgy:

Development of foundations for production of powder materials from the waste of machine-building, metallurgical and other sectors.

Development of technological processes for manufacture of parts and elements of machines and equipment by methods of powder metallurgy.

Use of powder materials to apply different types of surfaces and restore worn parts.

The Presidium of the Kazakh Academy of Sciences instructed the Research Center to implement a set of measures aimed at further expansion of work in the area of powder metallurgy.

\* \* \*

The Presidium of the Kazakh Academy of Sciences also adopted decrees pertaining to several other matters, in particular:

Work of the Institute of High-Energy Physics in the area of automation of physical experiments and scientific instrument making.

Implementation of the decree of the General Meeting and Presidium of the Kazakh Academy of Sciences in 1981-1985 by the Department of Physical and Mathematical Sciences.

Confirmation of plans for scientific research and introduction of results of investigations of the Kazakh Academy of Sciences for 1985.

Change in decree of the Presidium of the Kazakh Academy of Sciences and Presidium of the Republic Committee of Trade-Unions dated 29 April 1982, "Steps for further development and improvement of socialist competition among employees of scientific institutions of the Kazakh Academy of Sciences for fulfillment and overfulfillment of tasks of the 11th Five-Year Plan."

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## TRAINING AND EDUCATION

### COMMISSION REVIEWS KAZAKH ACADEMIC DECREE CONFERRING PROCEDURE

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian Feb 85 pp 8-15

[Text] In 1984, the chief of the State Inspectorate of the USSR High Degree Committee, G. M. Nesmeyanova, and State inspector of the USSR VAK [high degree commission], A. I. Pulyayev, inspected the procedure for conferring academic ranks in the Kazakh Academy of Sciences.

The results of this inspection and decree adopted by the VAK on the matter in question are published below.

#### Council Procedures for Conferring Academic Ranks in Institutes of the Kazakh Academy of Sciences

In the Kazakh Academy of Sciences, there are 31 councils, including 29 institute councils, the Joint Council of the Departments of Philosophy and Foreign Languages and Council for the Study of Productive Forces (SOPS), that are allowed to initiate applications to confer the academic ranks of professor and senior scientific associate.

In all there are 603 members in these councils, including 1 academician and 1 corresponding member of the USSR Academy of Sciences, 42 academicians and 52 corresponding members of the Kazakh Academy of Sciences, 216 doctors and 344 candidates of sciences; 43 council members have no academic rank, 62 are recipients of the Lenin, USSR and Kazakh State Prizes, 53 are honored scientists and 66% are members of the CPSU. The Scientific Council is manned by directors, deputy directors for scientific work, scientific secretaries, prominent scientists, as well as representatives of the institute's party and trade-union organizations and Council of Young Scientists. If necessary, sections are formed under the Scientific Council of an institute that are chaired by the deputy directors for scientific work or other prominent scientists. The membership of the Scientific Council and its sections is approved by the Presidium of the Kazakh Academy of Sciences for a 5-year term upon submittal to the director of the institute and examination by the office of the pertinent department of the Kazakh Academy of Sciences. The Scientific Council hears reports on all the most important aspects of scientific and administrative work, plans for training and advanced training of scientific cadres and questions of submitting names for academic ranks.

The scientific council of a scientific institutions submits to the Presidium of the Kazakh SSR, through the department office, all candidates for the academic rank of senior scientific associate and candidates for directors and their deputies for scientific work for the rank of professor. Applications to confer the academic rank of professor to doctors of sciences who hold positions of scientific department (laboratory, sector) heads are forwarded by the scientific councils of scientific institutions directly to the USSR VAK.

The State Inspectorate of the USSR VAK, together with the department for screening scientific cadres of the Kazakh Academy of Sciences, investigated the work of scientific institutions of the Kazakh Academy of Sciences pertaining to applications for academic ranks. When applying for academic ranks, all scientific institutions and their councils are governed by the requirements in the Statute, subsequent decrees and instructive letters of the USSR VAK.

We submit below the results of examining applications of scientific institutions of the Kazakh Academy of Sciences for the period of 1976-1983 to confer academic ranks:

Academic rank	Submitted	Approved	Denied	To be considered
Professor	50	45	5	--
Senior scientific associate	307	261	11	35
Docent	2	2	--	--

Some positive experience has been gained in scientific institutions in the matter of submitting scientific associates for academic ranks.

In the Kazakh Academy of Sciences, applications for academic ranks are viewed as the next, higher level of creative growth of personnel after they have received candidate and doctor of sciences degrees. A total of 75% of the scientific institutions of the academy did not receive a single refusal in 1976-1984 on the part of the USSR VAK and Presidium of the USSR Academy of Sciences to applications for academic ranks. For example, at the institutes of nuclear physics, high energy physics, mathematics and mechanics, mining, geological sciences imeni K. I. Satpayev, metallurgy and ore dressing, organic catalysis and electrochemistry and several others, administrators and party organizations devote much attention to increasing the effectiveness of scientific personnel, impose high demands on evaluation of their performance, including applications for academic ranks.

With regard to general guidelines in the approach to the question of conferring academic ranks, we should note the following: within the period in question there had not been a single application on the part of institutions of the Kazakh Academy of Sciences for conferral of academic ranks as an exception, virtually no institution submits candidates for the academic ranks of "senior scientific associate" and "professor" 1 year after they had been

chosen in competition to their jobs; as a rule, such applications are initiated only 5 years after re-election for a new term. For this reason, there is a considerable percentage of doctors and candidates of sciences in institutions of the Kazakh Academy of Sciences who do not have academic rank, but could be submitted for it by virtue of the positions they hold and other data. For example, of the 212 doctors of sciences at the academy, there are 183 working as heads of laboratories (departments, sectors) or in higher positions, 115 of whom have the academic rank of professor and 68 do not; 29 doctors of sciences are working as senior scientific associates. Out of 1631 candidates of sciences in the Kazakh Academy of Sciences, 1272 are working as senior scientific associates or in higher jobs, but 637 have the academic rank of "senior scientific associate" and 635 do not; 359 candidates of sciences are working as junior scientific associates.

While there is some specificity in the work of individual institutions, on the whole a certain system was formed in the Kazakh Academy of Sciences, the same procedure for all its institutions for undergoing certification of an applicant for an academic rank, from the time it is started to its delivery to the USSR Academy of Sciences in the case of senior scientific associate and to the USSR VAK in the case of professor.

As a rule, the head of a scientific laboratory (department, sector) takes the initiative in submitting scientific associates for the academic rank of senior scientific associate; the institute's administration does so for the rank of professor. A laboratory head first checks out this matter with institute administration and public organizations, then submits it for discussion in the laboratory. As a rule, the paper (report) of an applicant is delivered at a meeting in the laboratory, the results of his scientific research are assessed, as is the status of introduction of developments after defense of his dissertation. The decision of the laboratory meeting to submit the applicants name for the academic rank of senior scientific associate is forwarded to the institute's Scientific Council. Thereafter, the institute's scientific secretary (who is also the scientific secretary of the council) takes care of the paperwork of the applicant to be submitted to the Scientific Council. He transmits properly written up and prepared files to the institute's competition and certification commission, which is formed for 1 year. It is manned by a representative of administration (usually the deputy director for scientific work, who is also chairman of the commission), representatives of public organizations (party buros and trade-union committees) and competent scientists in the main scientific directions of the institute.

At a number of other institutions of the academy, where the staff is small, ad hoc commissions--for competitions or certification, depending on the nature of the business--are formed. The competition-certification commission examines submitted files for conferral of academic ranks, forms a conclusion on each of them and submits its recommendations to the Scientific Council. The council discusses the paper of the applicant with the results of his scientific research after defending his dissertation and his scientific-administrative work. After discussing the activities of the applicant, the Scientific Council arrives at a decision by secret ballot.

The institute administration then submits all files pertaining to conferral of academic rank of senior scientific associate and data for directors and their deputies for conferral of the academic rank of professor for discussion at a meeting of the office of the pertinent department of the Kazakh Academy of Sciences. Files with applications for the academic rank of professor for heads of scientific divisions (laboratories, departments, sectors, etc.) are sent directly to the USSR VAK.

The Department Office examines the submitted files for conferral of academic ranks at its meeting, according to a report from the administrator of the scientific institutions in the presence of the applicant and makes a decision by open ballot. The Department Office transmits files with applications for conferral of academic ranks to the Presidium of the Kazakh Academy of Sciences.

The files on applicants for academic ranks received by the Presidium of the Kazakh Academy of Sciences are considered by the department for screening scientific cadres of the Kazakh Academy of Sciences. It examines the file of each applicant, verifies accuracy and neatness of preparing all documents in accordance with the requirements in the Statutes and, if necessary, returns the file for correction and emendment of documents. A report is prepared on each applicant on the basis of the received files, which describes his main scientific achievements and other qualities. This report is read by the chief scientific secretary of the Presidium of the Kazakh Academy of Sciences, after which he sees all of the applicants for academic ranks, talks with them in the presence of the chief of the department of screening scientific cadres. In the course of the conversation, attention is given to the following questions: quantity and quality of published scientific works after defense of dissertation, opinion on them of competent critics; presence of author certificates, patents, etc., economic impact of introduced developments of the section and personal contribution of applicant; contribution of applicant to training of scientific cadres; awareness of the prospects for development of a scientific direction and concrete tasks of the scientific section, place and role in them of the applicant, etc.

On the basis of the results of preliminary examination of files of applicants and talks of the chief scientific secretary with them, proposals are prepared for the Presidium, as well as a draft of a decree, brief information about each applicant, which are duplicated and sent to members of the Presidium a few days before its meeting.

The Presidium of the Kazakh Academy of Sciences adopts a decree concerning submittal for conferral of academic ranks in the presence of the applicants by open ballot, personally for each candidate. After a positive decision is made by the Presidium of the Kazakh Academy of Sciences, the files of applicants for the academic rank of senior scientific associate are forwarded to the Presidium of the USSR Academy of Sciences, while the files of applicants for the academic rank of professor (directors and their deputies) are sent to the USSR VAK. In spite of the fact that there is a general procedure for examining and handling files of applicants for academic ranks in the system of the Kazakh Academy of Sciences, there are some specific elements in the actual procedure followed by a number of scientific institutions of

the academy. For example, at the Institute of Nuclear Physics, the laboratory head also takes the initiative in submitting a candidate for the academic rank of senior scientific associate. But there, the decision of the scientific-technical council, the so-called direction-department (there are three such departments in the institute that are headed by three deputy directors for scientific work; each comprises several related laboratories in specific directions and topics of research) is important. An applicant for the academic rank of professor or senior scientific associate is heard at a meeting of the NTS [scientific and technical council] of the direction-department (with presentation of scientific paper on the results of scientific and administrative activities after defense of dissertation). The NTS of the direction-department submits its conclusion to the Scientific Council of the institute as to feasibility of recommending the applicant for the academic rank of professor or senior scientific associate.

At the Institute of Mathematics and Mechanics, the nominated candidates are first discussed in the directorate and talks are held with them at meetings of the party bureau and trade-union committee. Due consideration is given to the quality of scientific publications, their publication in central scientific editions, the work of the applicant with graduate students, apprentices, young specialists, as well as his sociopolitical activities. As a rule, the applicant delivers a comprehensive scientific paper concerning his main achievements at a regularly scheduled urban seminar of mathematicians (in Alma-Ata), and submits an abridged version of the paper to the Scientific Council of the institute.

At the Mining Institute, when examining the question of applying for academic ranks, consideration is given primarily to evaluation of the applicant's performance according to the results of annual reports, reports on a completed scientific topic and reports on re-election to his job after the first term. Before hearing the reports, reviewers are appointed: for the intermediate reports--intramural, final--extra- and intra-mural. The laboratory initiates negotiations with the Scientific Council of the institute to apply for the academic rank only after hearing the report of a senior scientific associate concerning the results of his scientific work in the 5 years following his election by competition. At the Mining Institute, it is considered that the question of applying for an academic rank can be raised only after 5 years, i.e., at the time of the first re-election after election by competition. Approximately the same opinion is held by a number of other institutions of the Kazakh Academy of Sciences. For example, at the Institute of Organic Catalysis and Electrochemistry, application for an academic rank is usually submitted 5 years after election by competition to the pertinent job (senior scientific associate, laboratory head), i.e., after re-election to a new term.

In several other scientific institutions, it is considered possible to submit a candidate for the academic rank of senior scientific association 2-3 years after election by competition only if the applicant's publications have been well-rated in the press in this time or were awarded special prizes and bonuses.



Institute administration takes the initiative in submitting candidates for the academic rank of professor. For example, at the Institute of Philosophy and Law and other academy institutions, the eligibility of an applicant for the academic rank of professor is first discussed at a meeting of the directorate in order to determine the extent to which the scientific achievements and scientific-administrative activities of the applicant meet the requirements in the Statute. When the decision is in the affirmative, the directorate [or board] presents the applicant to the Scientific Council.

In several other scientific institutions, the files of applicants for the academic rank of professor are forwarded by administration to the competition and certification commission which decides whether the applicant can be submitted for conferral of the academic rank. This is the basis for further examination of the question of presentation for conferral of the academic rank of professor to a meeting of the Scientific Council. At the meeting, one of the deputy directors for scientific work reports on the applicant, then the latter delivers a scientific paper. The Scientific Council votes by secret ballot on whether the applicant conforms to the Statute requirements.

However, there are some significant flaws in the work of scientific institutions of the Kazakh Academy of Sciences in the matter of submitting candidates for academic ranks. In 1976-1983, the USSR VAK returned the files of 5 applicants and denied them the academic rank of professor because of the insufficient number of trained candidates of sciences and because the applicants had been assigned to jobs as department heads by appointment rather than election. In the same years, the Presidium of the USSR Academy of Sciences rejected applications for conferral of the academic rank of senior scientific associate of 11 staff members of the Kazakh Academy of Sciences.

The main reasons for denial and returning files submitted with applications for academic rank of senior scientific associate are as follows: insignificant papers, no publications in central scientific journals; applicant not presented in his specialty; papers filled out improperly; applicant was an employee in another system working at the institute on contract.

The scientific school headed by the applicant is not described clearly enough when submitting his name for the academic rank of professor at the institutes of organic catalysis and electrochemistry, history, archeology and ethnography imeni Ch. Ch. Valikhanov.

The clerical work of the councils must be improved; as a rule, duplicates of applicants' personal files are not kept. Not all councils are properly furnished with the standard documentation of the USSR VAK.

There is no system in checking the performance of Scientific Councils of academy institutions, there is no systematic training of scientific secretaries nor is the performance of Scientific Councils in the area of conferring academic ranks summarized.

Virtually no work is being done in the Kazakh Academy of Sciences in the area of conferring the academic rank of junior scientific associate.

Decree of the Presidium of the High Degree Commission under the USSR Council of Ministers

The Presidium of the USSR VAK notes that a system has been formed in the Kazakh Academy of Sciences of submitting candidates for the academic ranks of professor and senior scientific associate, which makes it possible to meet the increasing requirements imposed on applicants for academic ranks. In the period of 1976-1984, the councils of scientific institutions of the Kazakh Academy of Sciences submitted 357 applicants for academic ranks, 50 of whom applied for the academic rank of professor.

The way work is done in the area of submitting applicants for academic ranks by the Institute of Nuclear Physics, Institute of Mathematics and Mechanics, "Order of Red Banner of Labor" Institute of Geological Sciences imeni K. I. Satpayev, Mining Institute, "Order of Red Banner of Labor" Institute of Metallurgy and Ore Dressing, Institute of Organic Catalysis and Electrochemistry, Institute of Philosophy and Law and a few others merits attention. In this institutions, conferral of academic ranks is viewed as a new, higher step in the creative growth of scientific associates after they have received scientific degrees. It is considered feasible to initiate the paperwork to apply for academic ranks only after the applicant has worked a few years at a job to which he was elected by competition, if he has made a substantial contribution to scientific, public and educational work after defending his dissertation. Much significance is attributed to comprehensive and objective evaluation of scientific works, effectiveness of introduction of developments of applicants. Prominent scientists in both the applicants' and other institutes are involved in evaluating their scientific achievement. When applicants are submitted for academic ranks, preference is given to those whose publications have been well-rated in scientific journals, who have been recognized by the scientific community and given special prizes and scientific awards.

Special significance is also attributed to administrative capacities of an applicant as head of a scientific section, scientific school, educator and preceptor of young people, his sociopolitical activity and personal ethical qualities.

Requests of scientific councils to confer academic ranks are discussed at meetings of the office of academy departments. Then, after the chief scientific secretary has a talk with the applicant, the question of conferring an academic rank is submitted by the department of screening scientific cadres to the academy's Presidium for examination, and it makes the appropriate decision which is forwarded in accordance with established procedure to the USSR Academy of Sciences or USSR VAK.

At the same time, there are some flaws in the work of scientific councils of a number of institutes of the Kazakh Academy of Sciences in the area of submitting applicants for academic ranks. At some institutes, when presenting a candidate for the academic rank of professor, insufficient consideration is given to the recommendations in the instructive letter of the USSR VAK dated 8 April 1976, "Concerning justification of petition to confer academic rank

of professor to employees of scientific research institutes." As a result, the Presidium of the USSR VAK denied five applications for conferral of academic rank of professor due to the insufficient number of students, lack of scientific school and lack of scientific degree of applicants.

The Presidium of the USSR Academy of Sciences rejected 11 applications in the above-mentioned period for conferral of academic rank of senior scientific associate, 7 of which were denied because of lack of sufficient publications by applicants.

Conferral of the academic rank of junior scientific associate is not used enough at institutes of the academy as a form of rating the scientific qualifications of their staff.

Some scientific institutions are vague and careless in preparing primary documents, minutes of meetings of scientific councils at which the files of applicants for academic ranks are discussed.

The Presidium of the USSR High Degree Commission hereby resolves:

1. To approve in essence the positive practice of the Kazakh Academy of Sciences in solving problems related to conferral of academic ranks.
2. To instruct scientific councils of scientific institutions to constantly increase requirements for applicants of academic ranks and have the scientific community more involved in evaluating the applicants' scientific achievements. To recommend that reports of applicants about their scientific publications written after defending dissertations be heard before deciding on whether or not to confer an academic rank. To assess the scientific and practical impact of the work of the applicant for an academic rank, level of work done to train scientific personnel with the highest qualifications.
2. To recommend that the Presidium of the Kazakh Academy of Sciences and administrators of scientific institutions develop measures aimed at further rise in level of certification of applicants for academic ranks and at unifying requirements at all institutes in assessing scientific research and administrative performance of applicants, their participation in social work, propaganda of achievements of science, Marxist-Leninist theory and CPSU policies.
4. To request that the Presidium of the USSR Academy of Sciences disseminate among its institutes the positive practice of scientific councils dealing with conferral of academic ranks at scientific institutions of the Kazakh Academy of Sciences.

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## TRAINING AND EDUCATION

### SCIENTISTS' REPLIES TO POLL ON 'WHY YOUNG SCIENTISTS ARE AGING?'

Moscow LITERATURNAYA GAZETA in Russian 27 Mar 85 p 11

[Article under the rubric "Growth, Authority and Career"]

[Text] In our times of rapid spiritual and physical development, increasingly rapid progress of science and technology, it would seem that one should also expect earlier onset of peak "scientific form" of a scientist. In fact, the opposite is observed: the "median age" of discoveries, defense of dissertations, etc., is growing. Why is this happening? In No 27 (1984) of this newspaper, LITERATURNAYA GAZETA asked young scientists (the age was arbitrarily set at 35 years) to respond to a questionnaire on "Why are 'young scientists' aging?"

1. What was your scientific training when you started on your first job with a research group?
  - Had you done scientific work at a VUZ?
  - If so, did you do it alone or in a group?
  - Please describe the level of your scientific work as a student (participation in research under someone's supervision, independent research, etc.).
  - To what extent was scientific training at a VUZ useful in a real scientific group?
2. To what extent did your idea about the nature of modern scientific work coincide with reality. What were the main differences?
3. Please rate your knowledge in problems and methods of research when you began to work. How was your topic determined (did you choose it yourself, was it given by a scientific supervisor, etc.)?
4. Did you experience any problems of a "personal" nature or conflicts when you became part of your first scientific team? What do you think were the reasons?
5. At what age did you publish your first scientific paper? How many co-authors were there?

6. How old were you when you defended your candidatorial (doctoral) dissertation? When did you receive your scientific degree? What prevented you from getting it sooner?

Today we are publishing some of the answers in abridged form.

\* \* \*

I am 27 years old and I am a clinical hematologist. I studied well at school and at the institute, and had only two 4's among my grades for the diploma. I was engaged in scientific research at the VUZ under the supervision of a professor. This work brought me much joy and satisfaction. I gave birth to a child after graduating from the institute. I did not abandon my desire to do research work. I thought that I would work for 3 years as a young specialist, gain experience and then enroll for graduate studies. But this was only a dream. After an authorized leave, I underwent specialization, worked as a hematologist and district internist. But when I made a request to the administration to issue papers for me to attend graduate studies in hematology it was categorically denied (I already had a topic and had made an outline of work under the supervision of my supervisor, from whom I acquired experience and knowledge). Furthermore, I was even forbidden to work in my specialty, and I am now working as an on-duty physician [resident?]. I asked permission to work on my thesis, and again was refused! Why? The chief physician answered: "You have to work for 5-10 years, make a name for yourself, and then we'll see...."

My case is not unique. Many are in about the same situation. My husband began his graduate studies after 30 [years], since he spent many years on "proving himself."

This is my answer to the question of why "young scientists" are aging.

Ye. Polukhina, Novosibirsk

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In my opinion many "not so young scientists"--doctors of sciences, heads of departments, laboratories, sections, etc.--are to blame for the aging of "young scientists." They do not help in expanding and deploying scientific work; on the contrary, they inhibit initiative and growth of the young, they do not guide or support properly their research work. Fortunately, there are exceptions and they are genuine scientists, but there are not so many of them.

M. Tsagareli, candidate of biological sciences,  
Tbilisi

\* \* \*

I am one of those who "ruins" statistics: I submitted my doctoral dissertation to a specialized council when I was close to 50 years old. You will agree

that it is quite old. However, 5 years have gone by since then and I have moved on to the next age bracket, but I am still far from defending the dissertation. When I submitted my thesis to the council in the capital, I met another "martyr," who proudly informed me that he has been traveling to this council with his doctoral dissertation for the 9th year already (his age is close to 60)!

What is the matter? I think that the main reason for such occurrences is that we are competitors. Just listen to the word! It resembles "requesters." We are competing, asking for something that apparently only we need. For many people we are an unnecessary and perhaps even undesirable burden. Our papers are called "drifters" by book and periodical publishers. Even if the council does allow some of us to defend [a dissertation], it does not bring us either glory or additional wages--it simply means that someone prepared an unscheduled work, for which he will not even be thanked. The conclusion is that it is more expedient to hold on to what one has.

In my opinion, "young scientists" are aging because they do not feel an acute need (for anyone other than themselves) for a speedy defense of their thesis.

An aging applicant, A. Ch.

\* \* \*

1. When I started to work I had no scientific training.
2. My conception of science was of a certain "revelation of mysteries," but it turned out to be simple routine work, technical for the most part.
3. I had no experience at all with problem solving. I knew a little about methods. I did not pick the topic of my work, it was assigned to me even in spite of the narrow specialization that I gained at the VUZ.
4. I did not experience any particular difficulties. There is a division in the group: the "older" people on the one hand and the "girls," i.e., those of whom I was one, on the other hand. The former knew everything, what is being done, for what purpose and why. The latter executed their orders, and were silently amazed at how unserious and even trifling the work called scientific was.
5. I published my first paper at the age of 35 years. There were no co-authors.
6. Candidatorial at 45 years of age. The following factors were a hindrance: a) timidity, since we were taught to think that we were "girls"; b) inability to organize my work; c) lack of encouragement on the part of immediate supervisors.

Unsigned

\* \* \*

How can one equate defense of some dissertation with the title of scientist? Early defenses are presently available to "businesslike" people. Yet this seldom applies to a person of science. Moreover, if he lives in a rural area where there is no council, before which a defense can be made, he is usually concerned mainly with obtaining a meaningful result. "Shop coworkers" know such a person for a long time already and he enjoys authority, but he just does not have a degree. And it is only when he is "pressed" or forced, or else he is tired of having no money, that he takes the heroic step--to defend. At best this takes 3 years, time that takes him away from his regular fruitful scientific work. One cannot get behind in science, yet one has to.

I "defended myself" at 40 years of age, 10 years after my first publication. Nothing prevented me, I wanted to prepare a good paper rather than produce hackwork. In this time I published about 50 works.

A. M., Petrozavodsk.

\* \* \*

The flow of information that is dropped on the head of the poor scientific associate is increasing with each year, with each month. And, since the "biological" substrate, i.e., man, still has the same "carrying" capacity and it is unlikely that it will change markedly in the future, it is quite reasonable to assume that the age of "young scientists" will grow even more in the future....

G. N., Irkutsk

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## TRAINING AND EDUCATION

### COMPUTER SCIENCE TO BE TAUGHT IN USSR SECONDARY SCHOOLS

Moscow KOMSOMOL SKAYA PRAVDA in Russian 30 Mar 85 p 2

[Article by Yu. Budinayte, student on Journalism Faculty of Moscow State University, Minsk: "Dialogue With Computers--Taking Steps Toward One Another"]

[Text] The Politburo of the CPSU Central Committee has outlined steps to assure computer skills in students of secondary schools and broad introduction of computers in the educational process.

A decree was adopted on this matter by the CPSU Central Committee and USSR Council of Ministers. Computers will be used extensively in extracurricular forms of work with students, in organization of engineering creativity, in the activity of clubs, Pioneer centers and palaces of culture.

A bell rang out in the journalists' section of KOMSOMOL'SKAYA PRAVDA in Minsk: "Do you need a personal computer for school?"

Aleksandr Zakhre, a trouble-shooter for five-digit computers constructed such a computer himself. He invented, designed and assembled a personal computer to teach school children. Tenth-grader Igor' Saparov developed programs for it.

The children came to the journalist's section with a large bag. They first removed from it something like a typewriter and a portable television with a tiny screen. Then they took out a tape recorder with a broken lid and two plastic boxes. Visibly excited, Igor' connected all these things and put them together. Aleksandr offered an explanation:

"Our computer costs no more than 100 rubles. It has to be assembled. Of course, if produced commercially it will cost more, but not over 500."

Aleksandr Zakhre found Igor' at an exhibition of computers in the Electronics Hall. He suggested that he work on programs on his own home-made computer. Igor' accepted his suggestion.



We liked the home-made computer. But for it to start living it simply needed some support. And to support it, a competent opinion, evaluation and conclusion by specialists were needed.

But, as it turned out, the computer had already been shown to specialists. About 10 specialists gathered in one of the institutes in Minsk. They examined the computer without particular interest and said that all that had been invented long ago. That the computer was assembled from parts purchased in the Young Engineer store and for this reason could not be of any scientific interest.

Igor', however, did not agree with the specialists' opinion and went to a professor at the same institute. He wanted to talk with a responsible person, in order to defend his computer. I went with him.

The professor did not take to Igor'.

He was an energetic person, but extremely busy with his own affairs. Our appearance in his office did not prompt anything but irritation in him. He had seen the home-made computer and absolutely agreed with his colleagues. Moreover, he was the one who called the specialists together and was very sorry that he had wasted their time. He forbade mention of his name in the newspaper. He did not recognize any amateurishness and did not believe in a technical revolution "from the bottom."

Thus, here is a computer. Here is 10th grader Igor' who learned to make programs on it and was absolutely certain that any 3d grader could learn to use it. Here we have a professor who maintains that there are many computers better than this one. There are schools that need these computers. The only thing is that there are no computers in these schools.

I went to see Tamara Ivanovna Stankevich, director of the Minsk City Institute for Advanced Training of Teachers, without Igor'.

Unlike the institute professor, Tamara Ivanovna was faced with numerous problems of introducing computers to schools.

We discussed the first problem. That of overcoming the psychological barrier of teachers who will have to teach school children to use computers. For the teachers themselves are, for the most part, unfamiliar with computers. Tamara Ivanovna had overcome this barrier. She is a historian, but is quite conversant with technical terms.

Thus, teachers must be taught. And all is not so simple with electronic equipment for schools. It turned out that there is an acute shortage in our country of computers that would be suitable for schools.

Tamara Ivanovna liked the news that children have begun to build computers themselves very much. She did not even inquire about the technical qualities of the computer. The fact itself was important.

Then Tamara Ivanovna shared her plans with us. By 1990, there will be one computer class per 5 city schools.

This did not satisfy Igor'. It was too slow. According to his plans, apartment walls should be riddled with computer keys by 1990.

Igor' is a modern person.

"Let me speak with you as a specialist," said Stanislav Stanislavovich Shushkevich to 10th grader Igor' Saparov.

Igor' was embarrassed: "What kind of a specialist am I?"

But Stanislav Stanislavovich was essentially correct. The professor and the schoolboy discussed even the flaws in the computer like two specialists.

School children and teachers, physicists and electronic engineers, vocational-technical pedagogues, reporters--in short, concerned people gathered for a discussion in secondary school No 19 in Minsk.

Professor Shushkevich, head of the Department of Nuclear Physics at the Belorussian State University, displayed complete interest, even though he had put down our computer. It cannot be used as a means of programmed instruction in school subjects, it was simply not up to it. But, he said, it is a good and original designer for independent assembly.

Everyone agreed that this was remarkable, that such computers could be made in schools and colleges. And one could learn with them. If not physics and the Russian language, at least the fundamentals of programming and work with computers in general.

"Even if we take 500 steps while enthusiastic amateurs take only 1. Still it will be a step toward us, and we will ultimately meet faster," said Professor Shushkevich.

The incident with the home-made computer ended by having Vladimir Vasil'yevich Sharapov, deputy director of the republic's Institute for Advanced Training of Vocational and Technical Education Workers, suggest that Aleksandr Zakhre consider making several such computers at a time in the circle of technical creativity at one of the colleges. Vladimir Vasil'yevich estimated that our computer was quite suitable for laboratory work in the course of "Fundamentals of Informatics and Computer Engineering" at vocational and technical colleges. Furthermore, on the basis of such home-made computers one could establish, even now, a real (he stressed this word) instruction base.

Professor Shushkevich suggested that Igor' Saparov deliver a paper to the Scientific-Technical Student Society. And he invited him to visit his department from time to time.

There are quite a few people in Minsk engaged in development and introduction of computers in the school process. They do so because it is their duty, and also because of their interest. And there is a pupil at secondary school No 23, Igor' Saparov, who wants to meet them half-way.

Igor' Saparov is impatient.

"When would you like to come?" asked Shushkevich.

"Tomorrow," answered Igor' without hesitation.

But tomorrow was a Sunday and they agreed to meet on Tuesday.

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## TRAINING AND EDUCATION

### UPDATE ON RESEARCH ACHIEVEMENTS IN LITHUANIA

Vilnius SOVETSKAYA LITVA in Russian 20 Apr 85 p 3

[Interview with Yuras Pozhela, president of the Lithuanian Academy of Sciences, on the occasion of 21 April, Soviet Science Day by EL TA (Lithuanian Wire Agency)]

[Text] [Question] You reported at the general meeting of the Academy of Sciences in February that, at the present time, 12 institutes of the academy are working on more than 600 scientific topics. Which scientific works in the last 5 years can you single out?

[Answer] First of all, there is the work of mathematicians for development of asymptotic methods and theory of processes. They are used extensively in solving problems of control, recognition and static physics. They developed a number of mathematical models for quantitative experiments. For example, in microelectronics and solid-state physics.

New rust-proof coatings and technologies for them have been developed. Thanks to them, hundreds of thousands of tons of metal are saved in the country each year and, incidentally, this metal is of the highest grades. In the area of semiconductor physics, studies were made of the dynamics of high-speed hot electron processes, and new possibilities were found for development of ultrahigh-frequency generators. They will be used in computers and control systems.

After several years of work, a mathematical model was developed of water mixing in Lake Drukshyay, which made it possible to improve the forecast of lake temperature and determine the maximum permissible power of a nuclear electric power plant. This work has major theoretical significance, in addition to practical.

New physiologically active plant growth stimulators were developed at the Institute of Botany, and leukemia-control agents were developed at the Institute of Biochemistry, which are already in use in the country's agriculture.

[Question] The opinion is held that the humanitarian sciences are gradually being overshadowed by applied sciences. I refer specifically to linguistics,

history of literature and, in part, the work of historians. Can you refute this?

[Answer] Linguists, historians and sociologists have refuted this themselves. First of all, in their works. Moreover, the applied, as you say, sciences, primarily methods of mathematical analysis, have been instrumental in accelerating their investigations, for example, in screening and processing enormous amounts of information.

What about work? Each volume of the Lithuanian dictionary is already a monument to Lithuanian linguistics. Other dictionaries on the academic level have also been compiled and published--of polytechnical terms, Lithuanian surnames, bilingual, etc.

Last year, the first volumes of the "Collection of Lithuanian Folk Songs" and "Atlas of the Lithuanian Language" were published. They are the result of many years of work.

Two volumes of "History of Lithuanian SSR" have been prepared, covering the period from antiquity to our times. There, historical phenomena are viewed from profoundly class positions. Investigation is continuing of development of industrialization and collectivization of agriculture in Soviet Lithuania. Work has begun on a three-volume history of the Lithuanian Academy of Sciences.

In the area of social sciences, the Institute of Philosophy, Sociology and Law has contributed much activity. Many works of this team have been published in the form of monographs, among which we should mention those dealing with the history of esthetic thought and philosophical trends in Lithuania.

But it must be stated that, as they say, we would have liked to see more efficient work in some areas. For example, there has been excessive delay in publication of the dictionary of the Lithuanian language; historians and sociologists could also have responded more actively to the pressing ideological issues.

[Question] Integration of science with industry is becoming the main element of economic endeavor. In which sectors of the national economy is this alliance the strongest? Can you cite an example where a successfully completed scientific experiment immediately becomes the beginning and continuation of a production process?

[Answer] Unquestionably, the most vivid example is the collaboration of the Institute of Chemistry and Chemical Technology with machine-building enterprises. Last year, more than 800 plants in our country used technologies developed at that institute. The annual savings is 17 million rubles. This institute actually supervises the entire development of electroplating in the Soviet Union.

The experimental shops of our institute operate in such industrial giants as KamAZ and VAZ [Kamskiy and Volga automobile plants]. From here, the entire technology is "sent" right to the conveyer.

On the whole, we have tested several forms of integration of science and industry in recent years. The most successful and promising is the work of the Elektronika scientific production complex. At the present time, two more complexes, Gal'vanotekhnika [Electroplating] and Lasers are being established in this republic following an analogous principle.

It should be noted that the institutes have founded their own experimental plants: The Institute of Semiconductor Physics--an experimental plant for electronic and semiconductor instruments, the Institute of Mathematics and Cybernetics--an enterprise for software for computerized instruments, and the Institute of Physics--an experimental plant for laser and electronic equipment.

[Question] The Academy of Sciences has signed an agreement for collaboration with the city of Shyaulyay. What will the academy offer the city? Is not such a purely pragmatic agreement in contradiction with the very purpose of basic research? After all, it is probably unlikely that a scientific idea can be conceived and it is impossible to conduct an in-depth investigation by order of a single small town.

[Answer] There is no contradiction here whatsoever. On the contrary, this is expressly how integration of science with industry is manifested.

Shyaulyay "appealed" to us because the industry that best conforms to the interests of the academy is developed in this city on a rather high level. We have already accomplished something in 2 years. Automated control systems and microprocessors for the manufacture of television sets, complex integral circuits and sensitive semiconductor elements for the radio engineering industry, new diagnostic equipment for lathes and other instruments, etc., have been or are being developed. The Vil'nyale-2 and Vil'nyale-3 computers are working well in the shops of a television plant. On the whole, 50 academy laboratories are performing about 150 jobs.

Industry and ecology are the main directions, on which attention will be concentrated in the next 5 years. We hope to develop and introduce to most industrial enterprises of the city technologies for waste-free production, and we shall strive to have Shyaulyay become the ecologically most exemplary city in the republic.

I think that our higher educational establishments are also capable of solving such problems. Yet, only Vilnius University has begun to collaborate on a broader scale with Kapsukas....

[Question] You are a well-known specialist in the area of semiconductor physics. What basic discoveries can we expect in your field in the next few years? What about astounding discoveries in other disciplines and their practical use in our average generation, for example? Of course, we are not referring here to the devastating power of a genius....

[Answer] Elements for computers that will be able to perform 100 billion operations per second are already being developed and, no doubt, will soon be made. For the sake of comparison, let us indicate that at present the

"fastest" computer operating in our academy performs only a million operations per second, i.e., it is 100,000 times slower.

For such computers it will not be necessary to prepare programs. They will listen to the human voice, no matter what the language, and the computer will translate to the required language.

In biology, I believe, we shall learn to control vital processes on the molecular level. This means that it will be possible to conquer such a bane of mankind as ischemic heart disease and others.

Apparently we shall learn to recover electric power from water....

Unfortunately, the advances of science are being used thus far--and this is no secret--to develop weapons. Their destruction and not to allow new ones to be produced is the basic vital task of our time. This has been repeatedly stressed in the documents of all of the recent congresses of our party, and it was noted once more in the replies of M. S. Gorbachev, general secretary of the CPSU Central Committee, to questions posed by the editor of PRAVDA.

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## AUTOMATION AND INFORMATION POLICY

### COMPUTER PROMOTED AS TOOL FOR SOCIAL, ECONOMIC PROGRESS

Moscow NEDELYA in Russian No 29, 15-21 Jul 85 p 7

[Article by Yaroslav Golovanov, under the rubric "Man and the Scientific and Technical Revolution": "A Time for Search"]

[Text] What is it primarily that marks today's nationwide movement for intensive development in our national economy, for the improvement of its efficiency and the acceleration of scientific and technical progress? Search. Search in the most varied directions. A new technology is needed: can't we make it better, faster, more cheaply? How can we expend less energy? How can we achieve less waste? And for the waste that is still produced, isn't there some way we can use it as well? A discovery has been made: will we perhaps be able to adapt it to something about which the scientists who made the discovery had no idea? When a robot could fully cope with an uncomplicated process devoid of all creativity, why should a worker be required? What sort of confusion has cropped up regarding wages when the money paid is often inversely proportionate to the work expended? And how can we calculate all of this and foresee our own possibilities? After all, to foresee is to prevent...

It is simple to determine the end result of the search -- a growth in labor productivity through intensification of production. V. I. Lenin said that for us the most important thing is labor productivity. And another thing is clear: our search is designed not for a short-term campaign but for years; more accurately, it must become a constantly current factor with the years and turn into the norm. "We have to bring about a new technical reconstruction of the economy and qualitatively transform the material and technical base of society " is how the main task was formulated in a report from the conference on problems of accelerating scientific and technical progress, held in June of this year in the CPSU Central Committee.

The electronic computer and all the high-speed, total-memory and unfailingly obliging attributes that surround it today stand as a unique symbol of this new technical reconstruction.

The electronic computer is written and spoken about most of all. And it is about the computer that I would like to talk today, because it seems to me that people who have up to now not been connected in any way with such technology



(and, alas, they are the majority) have, to a certain extent, a distorted understanding of their possible future relationship with it.

Probably the most widespread mistake lies in the reassuring formula: "This is the scientists' business; let them occupy themselves with it. I have lived without computers, thank goodness, and will live the rest of life without them." This is not the business of scientists. It is our common business because the new technology, and most importantly the mode of thinking it brings with it, today are penetrating and tomorrow will have penetrated all plants, factories and combines, and the areas of transport, communication, information and domestic services -- our whole life. And scientists have nothing to do with this. Scientists have done their work; they thought it all up and showed us how advantageous it would be to put all this to use. But the adapting, incorporating, utilizing -- this is now our business. After all, nobody says that electrical energy is the business of electrical engineers. We have learned how to turn on lathes, stoves, lamps, elevators, television sets, vacuum cleaners and razors; we have learned to deal with them without electrical engineers and don't even sense any longer how convenient all this is. As you remember, in "The Crow's Settlement" by I. Ilf and Ye. Petrov, "Nobody's Grandma" did not trust electricity and burned kerosene on her mezzanine. Of course, one can live his life without the computer, but it will be a life in decline. Like the life of "Nobody's Grandma." There is still the notion of the "unskilled laborer". Today this is a person who doesn't possess enough skill to qualify him to operate a lathe, a machine or any kind of equipment. Tomorrow the unskilled worker (the name might change, but the sense will stay the same) will be anyone who doesn't know how to work with a computer.

But even if a person understands that electronics will conquer the world regardless of his wishes, even if he admits the inevitability of future contacts with computers programmed by the very course of scientific and technical progress, even in this case he is subject to another delusion, also rather widespread: "This business is so complicated that, with my student years long past, it's beyond me..."

Let us ask frankly: are you afraid of computers? Well, not really afraid but a little timid, right? I think that the writers of fantasy are guilty in this. In many fantastic works, "thinking" machines that have learned our human nature perfectly live an independent life of their own, constantly demonstrating their independence. We believed the dreamers, and unwittingly were gripped with timidity: they, the machines, knew us -- but we didn't know them. I checked: many people seriously suppose that the computer, maybe not today's but tomorrow's, is the equal of man. And why not, when "artificial intelligence" has become a well-known term in popular science journals? The computer can count faster, play chess, compose music and even poetry, and recognize images. Today it recognizes numbers on envelopes, tomorrow it will be able to recognize us on sight. On the other hand, why tomorrow? I read not long ago that abroad instead of a guard standing at an entrance they have a computer that stops a person or lets him through depending on the color of his eyes. This color turns out to be just as unique as fingerprints (and we didn't know this!). At

another entrance you have to show the palm of your hand to a chiromancer computer. By "reading" all the "life lines," the machine decides if a person belongs and should be admitted or if it is someone who should be stopped.

You will agree that all this gives a person removed from electronic technology a basis for being a little timid in the presence of a computer. Knowing all its real possibilities and suspecting imaginary ones, he cannot force himself to believe it is "inanimate." It is possible for this person removed from electronic technology to see a computer as "inanimate" and overcome his timidity only one way: stop being removed.

In fact, we don't feel timid in the presence of an office abacus. We don't see a calculator as alive. It is essential to understand that a computer is also an abacus -- but without the clicking beads, an abacus using a different basis and on an incomparably higher level -- but an abacus! And no more!

Seeking to attract people, primarily young people, to the new technology, we have not stinted on describing the wonders of the computer. We have said that the machine is capable of doing a million (and even more!) operations per second, expecting delight. But instead of delight there has been a certain constraint, because a person can't imagine "a million" and instead of admiration he feels a sort of personal inferiority. I think that today we must change our tactics of scientific popularization of the new technology a little. Isn't it time to "de-heroize" the computer? Shouldn't we direct all our efforts today towards convincing people that the computer, with all its "life," "sharpness" and "intellect," is still primarily nothing more than a tool, created by the life, sharpness and intellect of its creators. In the stone age a sharpened chip of flint on a stick was a tool. At the end of the twentieth century a computer is. That's how we must learn to relate to it.

Incidentally, the "wonders" of the computer have eclipsed in our minds other, much more amazing wonders. A reappraisal of values has come about. Who is surprised today, for example, by the fact that we talk to each other? Yet isn't it worthy of amazement that with the aid of certain words -- combinations of sounds customarily called letters, we can describe a whole world around us and within us? Why doesn't it surprise us that a two-year-old begins to talk by himself (!) and we can understand him? And isn't it a paradox that alongside this wonder to which we are accustomed it is hard for us to imagine how to communicate with a computer -- a "being" a billion times more primitive than any two-year-old?

Director of the USSR Academy of Sciences Problems of Cybernetics Institute Vladimir Andreyevich Melnikov thinks that children can play with computers. Is this possible? Yes, it is! Even very possible. Another academician -- Deputy Director of the USSR Academy of Sciences Radio Engineering and Electronics Institute Yuriy Vasilyevich Gulyayev -- noted that his young son puts together the "Rubic's cube" in two or three minutes, while he cannot do it in a week. Why?

A child's brain is "cleaner," it is free of our logical experience, it is capable of making associations that we grown-ups, alas, have irrevocably lost.

Preschoolers really will play with computers, as Academician Melnikov foresees. We played with tin soldiers, moving regiments over the field. Our grandchildren will move their regiments on terminal screens, or rather simply on screens connected to their home television toys. You look and a new boundary of tele-education is defined, support for the everlasting Khryusha. Today older students are learning to talk with computers. Tomorrow school children will be talking with them. In 20-30 years a new generation of people will be able to converse with a machine in its language like we can converse with each other, and nobody will be the slightest surprised by this. Gulyayev puts it very succinctly: "We are talking about a new level of literacy."

By the way, it was precisely from this point of view that "the language of cybernetics" was viewed in a conversation between journalist K. Levitin and Academician A. P. Yershov, published not long ago in NEDELYA (No. 51, 1984). We can only add that a great symbolism is hidden in this very formulation -- "a new level of literacy". In the twenties, universal literacy was practically the main slogan of the young republic of the Soviets; the worker and collective farmer sat down to a primer. This was a obligatory requirement of the times, an obligatory condition of putting our plans, our first five-year plans, into practice. And today when the party has formulated the general task of accelerating scientific and technical progress for us, when this task has been placed at the center of all the political, organizational and educational work of the party (which is precisely the way it was defined at the conference in the CPSU Central Committee) -- today we must sit down to a new "cybernetic" primer and master a new literacy, unknown in those long past years. This is the requirement of the times, the new obligatory condition for putting our new plans, our new five-year plans, into practice.

I graduated from Moscow Higher Technical School imeni Bauman in 1956. My degree project consisted of a whole booklet of computations and 16 pages of drawings on Whatman paper which it took me nine months of diligent work to draw. The word "display" did not exist then either in the real world or in the fantasy writers' vocabulary. Nobody imagined that you could draw on a screen with an electronic pencil, that you could "command" and the necessary detail would appear before you in the projection you needed, that somewhere in the depths of the "cybernetic brain" problems would be solved without error for the "involute" and "intersection" which the merciless Professor Arustamov used to give "for filling" during exams on descriptive geometry. It is difficult to prepare oneself for all these new possibilities. And it would have been difficult for Professor Arustamov, as it is difficult for thousands and thousands of engineers who received their diplomas in the 50's and earlier. It has already been pointed out that it is not easy to change the psychology of the "classical designer." He resists when his accustomed "lucky" Kuhlman pencil and soft eraser are taken away from him.

So I arrived at the scientific research institute with a brand new blue diploma -- of the type we had in the 50's -- that smelled of the bindery. I blew small models through laboratory aerodynamic tubes and, through optical glass windows, photographed the shockwaves made when my models crossed the sound barrier. And nobody knew that it was not necessary to make little models, order designers and build aerodynamic tubes, that it was not necessary to cut little windows in

them, put expensive optical glass in these windows, use up compressed air, make photographs and develop them, print the pale portraits of the shock waves and measure their angles from the photos. Neither I nor my strict boss, division head N. N. Shirokov, nor his good-natured chief, Academician G. I. Petrov, knew that none of this was necessary. Now we know: you have to set up a program and watch these pernicious waves on the screen and see how all this changes before your eyes depending on the speed of the flow and the form of the model, and if necessary you can redraw the form, make corrections and perfect it -- and if you need exact figures, there they are on a tape crawling out of the printer...

It's fantastic! I'm not even going to try to say approximately by what factor computers can increase labor productivity for the researcher and designer. And more than that, how much it can free a person from the tedious, mindless work that we apologetically call "everyday work" and which in fact is simply joyless, tiresome, purely technical puttering. Or how deeply it can provide a person with truly creative substance and at the same time give him the main joy of life -- the joy of ably, quickly and well executed work.

But here I am forced to stop myself in my own journalistic momentum. Yes, electronic computers, computer technology, mathematization of industry will undoubtedly bring us all the material and spiritual blessings that we have spoken of. But we should not view the computer as a new variation on the tablecloth from Russian fairy tales that serves meals by itself. That would be incorrect and harmful. Oh, how remarkable that would be -- to set up the computer and sigh peacefully: now everything will go as it should! It won't. The computer, set amid antiquated machinery and outmoded equipment is immediately deprived of its advantages. Many of our mathematicians and economists have rightly indicated this more than once. Academician A. G. Aganbegyan, for example, said at the conference that it is not the perfection of current machinery and technology that can give us the necessary effect but the transition to basically new technological systems. The electronic computer must be built naturally and logically into the new economy we are now constructing, and all the other factors defining the scientific and technical revolution must correspond to its emergence. And however important it is for us to learn to run all the truly fabulous instruments that science and technology are placing in our hands today, perhaps it is even more important to be permeated with the sense of the inevitability of unaccustomed changes and the need for an interested creative search for everything that will help us to move ahead as quickly as possible.

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## INDUSTRIAL AND COMMERCIAL APPLICATIONS

### GREATER INCENTIVES SUGGESTED FOR SPEEDY INTRODUCTION OF INNOVATIONS TO INDUSTRY

Moscow SOVETSKAYA ROSSIYA in Russian 22 Mar 85 p 3

[Article by P. Chervonobrodov, Moscow, under the rubric "Problems of Introduction--How to Mobilize Incentives": "From Drawing Board to Conveyer"]

[Text] There was an interesting suggestion in the article, "Experiment for Designers" (SOVETSKAYA ROSSIYA 11 Jan 85). Its author, in commenting on the fact that the end result of a designer's idea is implemented years later, considers it necessary to issue a money certificate to each participant of a development, which would attest to his creative contribution and share of participation in developing the innovation. It is proposed that it be used to offer incentives to a designer, when the impact of using new equipment is determined. However, how can the effect be determined? Is everyone equally interested in it?

Let me begin with an example. Let us say that a meeting is in progress of a commission for certification of machinery to award the Emblem of Quality. Of course, the producer is interested in receiving this emblem; it entitles him to add a surcharge to the price, which augments the enterprise's fund that is used to award prizes to workers.

The buyer enjoys the improvement of consumer qualities of the machine because of its greater reliability, labor productivity and reduction of repair costs. But the incentive fund for employees (which is very important) who received by allocation, let us say, a new automobile, will not change in any way. Everyone knows this, including the developers. The question arises as to whether the consumer is always interested in an innovation. And what if, in addition, the developer's and buyer's opinions about the new equipment do not coincide?

Let us imagine another situation. Let us assume that a certain motor transport enterprise has a development fund that it actually both earns and disburses. The enterprise has the opportunity to select the brand of vehicles that suit it in tonnage, specialization of classes of freight hauling, level of reliability and other features. On the one hand, the profit of the motor-transport enterprise depends on fulfillment of the client's plan and, on the other hand, on expenses to acquire vehicles, their technical and operating upkeep. Consequently, if one overpays unjudiciously for new equipment, one feels it right away in one's own pocket.

Speaking of effect, one should discuss the question of time also. After all, the effect of, for example, extending service life of a machine will be fully manifested in about 10, if not 15 years after designers have developed the same vehicle on a sheet of paper. So how can one overcome the time rift? If the problem of consumer interest in a new product is solved, it is not difficult to imagine what kind of system there should be to overcome this rift.

We view the system as being made of up several "units." The first is competent expertise which, on the basis of systematized information, will determine the quality indicators and dynamics of efficiency as to time. Such information is contained in data banks that accumulate the results of observing operation of machinery during plant tests on stands and at base operating enterprises. In this way one can estimate with greater probability the effectiveness of designs and technological developments even before mass production of a new machine will begin.

Next "unit." If a plant is interested in working full steam on the requests of consumers, the better he copes with this task, the more this should be aided by its physical and technical resources. In what way? By means of surcharges to prices, the extent of which within a given range should be determined by agreement by the consumer and producer.

Another "unit." Let us say you took over an effective innovation and an effect was obtained, from which you rewarded the initiators of the innovation and then, you must be good enough to deduct part of the effect at the expense of the enterprise that started it out in life. And, in the nature of a tax, there is a separate deposit to the national fund for new equipment and innovations according to the established standards.

Certainly the employees interested in putting out a high-grade product will find it possible to reward the developers of new equipment on the basis of an objective evaluation of its qualitative parameters.

Let us imagine that there is interest in innovations. There are financial and physical resources in reserve. Is this enough to rapidly give life to new ideas? There are more and more innovations, particularly those that are basically new, that are conceived on the boundary between different branches of knowledge. Quite a few of them are initiative, not provided in plans and do not fit into the mainstream of main activity of the organization in which the inventor works. In order to promote such innovations there must be a flexible alliance of both intellectual and physical resources. The former can be achieved by forming temporary scientific production groups. The latter, by organizing ashare association.

As we know, the status of the former has been established, and the task is to use this form and refine it. The statute on share associations has yet to be worked out. We are referring to share participation of concerned enterprises in financing and furnishing resources for the cycle of work from idea to its implementation. The first stages are the technical assignment, drawing and blueprint, prototypes of product or technology, their experimental testing

and completion for rapid implementation require use of reserve funds of the concerned organizations.

And if the initiative collective undertakings of organizations under the jurisdiction of different agencies and enterprises will result in physical execution of the latest technical, technological and organizational innovations under distinct conditions of cooperation on the principle "for all and for oneself," the national economy will only profit from this.

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## REGIONAL ISSUES

### ROLE OF KIRGHIZ HIGHER SCHOOL IN REPUBLIC S&T PROGRESS

Frunze SOVETSKAYA KIRGIZIYA in Russian 2 Aug 85 p 3

[Article by Rector of Frunze Polytechnical Institute Professor V.M. Zhuravlev: "Do Not Be Late for the Leaving Express"; first paragraph is SOVETSKAYA KIRGIZIYA introduction]

[Text] At the recently held meeting of the republic party and economic aktiv on the results of the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress among the problems, which were brought to the forefront, the need for the better use of the scientific potential of higher educational institutions was discussed. The more extensive involvement of the science of higher educational institutions in the solution of important national economic problems is discussed in the article of Rector of Frunze Polytechnical Institute Professor V.M. Zhuravlev.

The current scientific and technical revolution, like an express, is rapidly increasing its pace. Technologies are quickly changing and becoming obsolete, the ideas about the potentials of technical systems are being shattered, the view of the place of man in modern production is changing. Quite recently the role of higher educational institutions as scientific centers was underestimated. Their contribution to the accomplishment of important scientific programs was not planned, and the solutions of urgent national economic problems were actually farmed out to the educational institution itself. But today they have begun to talk about them as an important link in the intensification of production.

The possibilities of the science of higher educational institutions is visible from the example of our institute. In the past two five-year plans the amount of scientific research has increased by nearly eightfold, the economic impact from the introduction of scientific developments in production came to more than 30 million rubles. Two problem and several sectorial laboratories and strong scientific groups in the field of geology, strength mechanics, automated control systems, computer technology, robotics, atmospheric physics, and others were set up. Each year more than 70 technical solutions, which have been obtained at the higher educational institution, are recognized as inventions. In recent years the scientific prestige of the collective of Frunze Polytechnical Institute in the republic has increased immeasurably, while its participation on the "Tool" and "Flexible Machine Systems"



scientific and technical programs and in the solution of the problems of the Issyk-kul-Chu Territorial Complex will make it possible to increase even more the return to the national economy.

But still the procedure of conducting research at higher educational institutions, which is in effect today, and the forms of scientific developments do not stimulate either their quality or the broadening of the spheres of the application of forces.

Let us take, for example, the scientific research being conducted at higher educational institutions on themes financed from the state budget, which are carried out by an instructor by means of the time which is specified for him by the individual plan. The planning of this work in essence runs from the individual, special themes of instructors and chairs to the themes of the higher educational institution. These themes are often poorly interconnected. Many instructors stubbornly cling to themes, which have been tested over many years and are rehashes of candidate dissertations. Of course, there is no point to such science, not specific practicable technical solutions, not the development of the fields of the basic sciences, but a chaotically written report, which remains forever to gather dust in the archives of the chair, is its result. Incidentally, at many higher educational institutions the making out of scientific reports is not even envisaged by the prevailing statutes, which creates a legal basis for the desecration of science and idleness.

I had occasion to inspect the higher educational institutions of our republic. You are automatically astonished, when you see at one chair uncontrolled work on various themes--here there are as many of them as there are instructors. For example, at one of the chairs of the social sciences--from the economics of the timber industry to esthetic education. Here it is, one of the reserves of the involvement of instructors in a truly urgent, important national economic theme: the planning of science financed from the state budget at higher educational institutions should proceed from the top down--from the comprehensive goal programs to the programs of the higher educational institutions, from them to the interchair plans, and then to the plans of instructors. In this case the scientific research of each instructor becomes an integral part of a large and important scientific theme and acquires the nature of an obligation.

It is customary to believe that in the republic the Kirghiz SSR Academy of Sciences is the coordinator of the performance of scientific research on the natural and social sciences, ministries and departments--on scientific and technical problems, the Kirghiz SSR State Committee for Construction Affairs--on construction themes. But, in analyzing the state of affairs, you arrive at the opinion that this coordination exists only on paper.

The Academy of Sciences and the State Committee for Construction Affairs are occupied with the same thing--the gathering of information on the work being performed. The content of research and the progress of the fulfillment of themes in essence are not checked by anyone. The results are often reported formally. I do not recall in recent years a case when an institute reported back on the performed research at any republic academic or main sectorial institute.

Things are no better in the Kirghiz SSR Ministry of Higher and Secondary Specialized Education. Formally all the necessary methods of coordination are available, but they are not operating. The sections of the scientific and technical council are not functioning, the scientific discussion of the themes being carried out at higher educational institutions is scarcely being conducted, as before administrative forms predominate in the ministry in the style of management of the science of higher educational institutions, leading scientists of the republic are being poorly enlisted in this work. The beliefs that it is possible to solve the problems of science by orders and circulars, have not been eliminated.

The higher educational institutions, which are actively conducting scientific development on the basis of economic contracts with enterprises, are in a difficult situation. Apparently, this is one of the causes of the situation that the polytechnical institute accounts for a large portion of the total number of contracts, the university accounts for a part, and the eight other higher educational institutions of the republic account for very little.

The contracts are concluded on an initiative basis, they are often not included in the plans of ministries and departments and are not checked by interdepartmental organs, the comprehensive planning of all the stages of scientific research work is absent in them. The lack of preparation of introduction, a low return on invested assets, and the solution of not priority, far from global problems of production are the result of this.

Precisely for this reason the polytechnical institute in its economic contractual activity has to look more toward contacts with union ministries and departments, in which the questions of the organization of scientific research with higher educational institutions have been placed on a planned basis. Precisely there developments find their effective use.

For many years now the sectorial scientific research laboratory for the mechanization of drilling and blasting operations of the institute has been performing work at the Yakutalmaz Association and the Karatau Mining and Chemical Combine. During this time a number of important scientific and technical problems have been solved, an economic impact of 3 million rubles has been achieved. The technology of the preparation of highly efficient concrete mixes, which provides a substantial saving of cement, has begun to be used at Leningrad enterprises and, at present, at Moscow enterprises. The higher educational institution has established with them creative relations and the mutual trust of equal partners.

The picture changes strikingly, when republic ministries and departments enter into contacts. It seems that this is not so much their fault as their misfortune. The lack of preparation for work with higher educational institutions and the inability to use the developments of scientists of higher educational institutions in many ways are explained by the weakness of the work of planning organs.

The urgent need has arisen, following the example of the Azerbaijan SSR, to prepare and approve at the level of the republic Council of Ministers scientific and technical comprehensive goal programs of the developments of

higher educational institutions for departments and enterprises. Such a procedure of conducting scientific research would increase the mutual responsibility of the scientific collectives of higher educational institutions and enterprises, would make it possible to loosen the bottlenecks of production, and would aim at the conducting of a number of promising research operations.

There, in these goal programs, it would be possible to envisage the allocation of special assets for the creation of a modern base of scientific research. A substantial reserve of the science of the higher school would be a well thought out system of the introduction of its developments in production. Today higher educational institutions after completing a stage of scientific research work remain alone with the client, who does not assume any obligations on the further introduction of a development and the responsibility connected with it.

To some extent these shortcomings could be offset by the activity of ministries, departments and planning organs, which are called upon to solve these problems in conformity with the requirements of the times. However, the impression is being formed that in the republic they are treating these questions extra calmly.

Several years ago a centrifugal drier of a new type was developed at the Chair of Machines and Equipment of Food Production of our institute. The author, an instructor of the chair, received a certificate of authorship for it. A prototype of the drier was produced, it is possible to dry in it practically any food product--juices, milk, and much more. It seemed that they should, as they say, seize hand and foot this device, in which a number of sectors of the republic are interested today. However, not wishing unnecessary trouble, the Ministry of the Food Industry and the Ministry of the Meat and Dairy Industry did not display any activeness in the use of this development.

The suggestions of the institute on the establishment of laboratories of laser technology, heat treatment, nondestructive methods of testing at a number of machine building enterprises of the city of Frunze, the induction heating of reinforced concrete items, the technology of concrete mixes and ceramic items by construction departments have been discussed for several years. But all these problems to this day have not been solved in the republic.

The prestige of science of higher educational institutions, which has increased in recent times, is connected with the development of the experimental base. Indeed, the scientific developments of higher educational institutions have acquired a real nature in the form of small-tonnage chemical production, "intelligent" robots and machines, control equipment based on microelectronic engineering, and so on. The products of the higher educational institution are being used today at the Kurpsayskaya and Tash-Kumyrskaya GES's, the Khaydarkan and Karatau mining combines, and enterprises of Yakutia and Magadan Oblast.

And still there are many difficulties in the plan of the development of the experimental base of science of the higher educational institution. First of all the limitedness of production areas and the inadequate supply of

equipment. The scientific groups at the chairs share work spaces with educational laboratories or lease basements and facilities, which are little suited for research work. The unified funds being allocated to the higher educational institution do not envisage the support of scientific activity. If we examine the problem of the experimental base of the higher educational institution in the future, with allowance made for the demand of other higher educational institutions of the republic, the need has arisen, in our opinion, for the establishment of an entire pilot plant with its own plan of the output of products.

Finally, concerning the specific nature of science of the higher educational institution, which in contrast to the research of academic and sectorial institutes presumes the active participation in it of a large group of young people--students. The new shoots of specialists, which tomorrow will come to the works and the scientific research institute and will take an active part in the acceleration of scientific and technical progress, mature and grow strong on scientific research at the higher educational institution. To teach each of them active creative work, the solutions of nonstandard problems, scientific thinking, and the practice of experimentation means to make them active participants in the socioeconomic process of the further development of society.

At our institute the path to science for young people is open through the student design bureaus. Participation in them gives the student practical skills of work in a creative collective and promotes the extension of knowledge and the increase of responsibility for studies, and speeds up the adaptation of graduates at the works. Today there are 16 of them at the institute. For example, the Azamat Special Design Bureau of the Chair of the Theory of Machines and Mechanisms, of which Corresponding Member of the republic Academy of Sciences Professor L.T. Dornikov is the manager, has existed already for 15 years. Among his students are candidates of sciences, winners of the Lenin Komsomol Prize, and managers of design bureaus of planning institutes and enterprises. The institute's special design bureau has been commended more than once in all-union review-contests.

It is a pity that other higher educational institutions are poorly following the example of the people of the polytechnical institute. Except for the special design bureau of the Biology Faculty of the Kirghiz State University and the Chair of Physics of the Kirghiz Agricultural Institute, there is no one else to name. But this is also an enormous reserve of science of the higher educational institution.

The tasks set for the higher school by the party are complicated. Let us say frankly that the scientific collectives of higher educational institutions for the present are not playing a substantial role in the acceleration of scientific and technical progress in the republic. To help to use the reserves of the higher school and to establish an efficiently operating system of the introduction of the results of science of the higher educational institution is the common task of party and soviet organs, ministries, and departments of the republic. On their part the scientists of higher educational institutions should exert the maximum efforts for the solution of

the important, key problems of science and production for the training of specialists of the current formation.

7807

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## REGIONAL ISSUES

### KIRGHIZ ACADEMY PRESIDENT ON REPUBLIC S&T PROGRESS

Frunze SOVETSKAYA KIRGIZIYA in Russian 28 Aug 85 p 2

[Interview with President of the Kirghiz SSR Academy of Sciences Myrzabek Imanaliyevich Imanaliyev by L. Zholmukhamedova: "In Cooperation With Practice"; date and place not given; first paragraph is SOVETSKAYA KIRGIZIYA introduction]

[Text] President of the Kirghiz SSR Academy of Sciences M. I. Imanaliyev reflects on the responsible tasks of the scientists of the republic, who are called upon to make a decisive turn toward the needs of social production.

[Question] Myrzabek Imanaliyevich, a close connection with the national economy is the basic principle of the activity of academic institutes. However--and this must not be forgotten--everything begins with thorough basic sciences. How, in your opinion, should basic and applied research be combined?

[Answer] The word "basic" speaks for itself. Basic science acts as the generator of ideas, makes breakthroughs into new fields, and provides outlets to a new level of efficiency. Science always and at all times strove to get to know the unknown, moreover, far from always with an immediate practical result. However, there would not have been an Aristotle, a Euclid, a Newton, and many other theoretical scientists, if there had not been an entire chain of impressive scientific discoveries which provided at times unexpected, extremely effective practical results.

I want to say that basic and applied research are fundamentally connected. They mutually enrich and complement each other. And one must not, by taking refuge in "pure" science, brush applied science aside. For it is no secret to anyone that scientific collectives, in which both theoretical successes are not evident and there are no applications, exist. The research of such scientists, who are capable not only of brilliant ideas, but also of knowing how to see them through, interest us. That is, to bring them to practical use.

[Question] It is well known that during the years of the 11th Five-Year Plan alone 300 proposals of scientists of the republic were introduced in

production with an economic impact of more than 70 million rubles. Tell us, please, in what directions was this work performed?

[Answer] It is simply impossible to tell about all the directions. I will name just a few. Mountains occupy a large portion of the territory of our republic. And, of course, the elaboration of recommendations on the development of the mountainous territories, which are rich in energy, water, and mineral raw material resources, is one of the main tasks of scientists. Scientists of the Academy of Sciences have developed the Askatesh highly mobile mine drilling units, stone-cutting machines, small loading and delivery machines, and other equipment for the complete mechanization of mining and construction operations. The construction of a special scientific production base for the output of prototypes of such machines is being carried out.

Participation in the conducting of the Vega-1 and Vega-2 international scientific experiments, on which SOVETSKAYA KIRGIZIYA has already reported, is a very important scientific and technical achievement of our scientists.

Research on the increase of the efficiency of pastures is being conducted on the basis of the achievements of modern biological science. The use of the results of scientific research is making it possible to decrease sharply the infestation of pastures with poisonous and rubble herbage and to increase their productivity with respect to protein by 125-150 percent. Recommendations on the development of mountain slopes and foothills by terrace plantings have been elaborated and introduced.

Using the achievements of advanced science and agricultural technology, scientists have already achieved on experimental plots a yield of seeded and irrigated pastures of up to 700 quintals of green matter per hectare. The task is to use the scientifically sound recommendations of scientists on the largest possible territory of hay fields and pastures of the republic.

[Question] But the inverse relation "science to production," what is it providing?

[Answer] Science is helping production. Production is helping science. How? By the fact that the real scientist cannot confine himself to the walls of his laboratory without detriment to creativity. Precisely at the works the scientist is enriched by ideas and conducts research more fruitfully. We are speaking about scientific and technical progress at the works, which directly depends on the successes of science. But the contact with production, undoubtedly, also has a beneficial effect on science.

Although I should say that these contacts are not always accomplished properly. Such an expression "the problem of introduction" has already become stable. What kind of problem is this? This is the problem of conflicts between scientists, who advance ideas, and managers, who fear risk. And such conflicts, unfortunately, are frequent. I will not claim that scientists of the republic always and in everything anticipate the demands of the times. We have many of our, internal, problems which, in turn, hinder scientific and technical progress. However, at present it is a question of contacts with production. And it is necessary to emphasize that managers, in order not to



burn their fingers, temporize, wait for the results of pilot tests at other enterprises and other farms.

Here is an example. At present the institutes of the natural science and technical type receive annually 100-120 certificates of authorship, which testifies to the uniqueness and patent cleanness of the developments. In itself the fact of the issuing of a certificate of authorship is a recommendation of the State Committee for Discoveries and Inventions for their introduction. However, in practice many sectorial ministries and departments ignore this source of the improvement of production and this lever of scientific and technical progress and wait for some special instructions on the fact that it is necessary to use inventions. The proposals and recommendations of scientists, even those approved by the republic government, are included with great difficulty in the plan of introduction of enterprises. This applies, for example, to the Ministry of Agriculture--with the introduction of recommendations on the improvement of natural and cultivated pastures and hay fields, to the Ministry of the Food Industry--on the processing of tobacco scraps and the obtaining of citric and malic acid and carotene, to the Ministry of Construction--on the introduction of advanced methods of the organization of labor, and a number of others.

The inertia of thinking and unjustified caution are among the stumbling blocks in the way of scientific and technical progress. And it is necessary to combat this in every way.

[Question] Myrzabek Imanaliyevich, the integration of science with production is a problem which has been urgently posed by life itself. What, in your opinion, is it necessary to do today for its successful solution?

[Answer] As was noted at the conference of the republic party and economic aktiv, which was held in July and examined the results of the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress and the tasks of the republic organization, academic science should make a sharp turn in the direction of production. And that in this connection the question of the establishment in the republic of new scientific production associations should be carefully examined. For example, for the purposes of the acceleration of the introduction of new equipment for the intensification of production and the mechanization of labor-consuming processes in the quarrying and processing of natural stone it would be possible to establish a scientific production association on the basis of the Institute of Automation and the enterprises of the Ministry of the Construction Materials Industry and the Administration of Geology. It seems that the need has arisen for the establishment of a scientific production association for the production of biological compounds on the basis of the Institute of Biochemistry and the Ministry of Agriculture.

I am confident that the establishment of scientific production associations will strengthen considerably the contact of science with production. It will make it possible to achieve a decisive change in the minds and moods of both scientists and managers, having focused their attention on the acceleration of scientific and technical progress.



[Question] A plan of measures on the acceleration of scientific and technical progress has been drafted at the Kirghiz SSR Academy of Sciences. Toward what, in particular, are these measures oriented?

[Answer] First of all toward the leading development of the basic sciences and the concentration of the basic scientific forces and material resources on the key directions, which promote to the greatest degree the solution of scientific and technical problems and the development of the leading sectors of the national economy of the republic. In particular, we intend to determine the priority directions of basic and applied research in the area of the natural and technical sciences, for which adjustments will be made in the draft of the 5-year plan of scientific research work for 1986-1990. We will devote particular attention to the work on scientific, technical, and socioeconomic forecasting and to the formulation and implementation of a comprehensive program of scientific and technical progress for the future jointly with the republic State Planning Committee. There is much to do. But the scientists of the republic have sufficient forces and knowledge.

7807

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## GENERAL

### IMPROVEMENT OF RELIABILITY OF EQUIPMENT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Sep 85 p 1

[Article: "Reliability for Equipment"]

[Text] When at the height of the harvest work a powerful combine hopelessly comes to a standstill in the middle of the field due to the failure of some part, the machine operators have a right to lodge--and do lodge--the most serious complaints against machine builders. Today, unfortunately, there are many grounds for them. For example, specialists of the State Committee for the Supply of Production Equipment for Agriculture last year submitted to check tests nearly 1,500 agricultural machines which had just been produced. It turned out that 37 percent of them did not satisfy the technical requirements with respect to reliability. While the machine testing stations recommended that a third of the models not be accepted from the plants until the defects are eliminated.

At the conference of the party and economic aktiv in Tselinograd it was emphasized that the implementation of the Food Program is an urgent matter which requires particular attention. In order to create the necessary base for the intensification of agroindustrial production, today the thorough modernization of agricultural machine building is being carried out. The increase of the quality of equipment for fields and farms should be one of its results. Understanding this, the labor collectives of the Ministry of Tractor and Agricultural Machine Building in the socialist obligations for the coming five-year plan planned to increase cardinally the reliability of the equipment being produced and to increase by 15-30 percent the service life of tractors to the first overhaul.

Similar steps should also be taken immediately in other sectors. The question of the reliability of equipment was raised with all urgency at the conference of the party and economic aktiv of Tyumen and Tomsk Oblasts, at which it was emphasized that the machine builders greatly let down and are letting down the petroleum and gas producers. In the northern and eastern regions of the country machines and equipment have to operate at low temperatures, in corrosive media, and under the abrasive action of ice and hard rock. The harsh conditions of these regions clearly showed: the most highly productive equipment does not yield the anticipated results, if it frequently breaks down.

It can be safely asserted that the increase of the reliability and durability of equipment is one of the greatest reserves of our economy. It is clear to everyone: the increase of the service life of machines, equipment, and tools is equivalent to the increase of their production. Moreover, almost without expenditures of metal, energy, and labor. If there is no need for such an increase, it is possible to decrease the production volumes of the corresponding equipment, having saved considerable resources.

On the other hand, the underestimation of the questions of reliability at the present stage of the development of production threatens enormous losses. Yesterday we could believe that the bulk of them are the large expenditures on repair, which at times exceed by 1.5- to 2-fold the initial cost of the equipment. But today the situation has changed radically. Many sectors of the national economy are pursuing a policy of the development of units and machines with a large unit power. The shutdown of one such unit, for example, in chemistry is equal to the loss of the output of a medium-size plant, the breakdown, say, of a heavy dump truck is equal to the idling of a whole 10 ordinary trucks.

The intolerability of such a situation, when equipment being newly developed already at the stage of designing proves to be obsolete and is inferior to the best models in reliability, service life, and economy, was noted at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. In order to avoid this, a clear understanding that the intensification of production is impossible without the sharp increase of the reliability of equipment, should be formed in the collectives of scientific research institutes, design bureaus, and industrial enterprises. The efforts of party organizations, the scientific and technical community, inventors, and efficiency experts should be aimed at this.

An extensive arsenal of methods and means, which make it possible to increase significantly the reliability and service life of machines and equipment, has been developed by the efforts of scientists and specialists. Practical experience has shown that one of the main causes of breakdowns is the rapid wear of parts and even of their individual sections. It is possible to combat this phenomenon by laser surface hardening, the plasma spraying of the appropriate powders, and directed "intervention" in the structure of metal. As a result it is possible to increase the life of parts by 3- to 4-fold, and at times by 10-fold. For the present, unfortunately, the users of the equipment, and not the sectors which produce machines and equipment, are more willingly adopting these methods.

Technical diagnosis systems are affording great possibilities in the direction of the increase of reliability. Equipped with computers, they make it possible to identify in good time, which of the assemblies of a machine is on the verge of failure, and to take the appropriate steps. The extensive introduction of such systems depends first of all on the specialists of the Ministry of Instrument Making, Automation Equipment, and Control Systems, who should step up the work in this important direction.

It goes without saying: the problem of increasing the reliability of equipment is one of the most difficult ones, which requires the united efforts

of many sectors. Appearing on the pages of SOTSIALISTICHESKAYA INDUSTRIYA, specialists have repeatedly raised the question of the low reliability of robots, particularly those which are produced at enterprises of the Ministry of the Machine Tool and Tool Building Industry. In turn, the workers of this ministry, while recognizing the criticism to be correct, are lodging serious complaints against the components which are supplied by enterprises of the Ministry of Instrument Making, Automation Equipment, and Control Systems and the Ministry of the Electrical Equipment Industry. The quality of a number of lubricants, which are produced by petrochemical workers, is also evoking many reproaches.

In order to solve these problems, the All-Union Reliability Program is now being formulated on the initiative of the USSR State Committee for Science and Technology. It is necessary to expedite its formulation and to exert the maximum efforts so that the measures outlined by it would be of a comprehensive nature.

The reliability and trouble-free operation of equipment are a priority concern of its developers and an important condition of the accomplishment of the task posed by the party on the intensification of the economy.

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GENERAL

## SCIENTIFIC AND TECHNOLOGICAL REVOLUTION INSPIRES CREATIVITY

Tallin SOVETSKAYA ESTONIYA in Russian 16 Apr 85 p 2

[Article by V. Sokolov, candidate of philosophical sciences, docent in the Academy of Social Sciences under the CPSU Central Committee, under the rubric "Developed Socialism--Theory, Knowhow and Goals"]

[Text] The increasing role of the human factor in social progress is becoming the most important feature of developed socialism. And, the more difficult and important the tasks that must be performed, the more necessary it is to mobilize all creative forces, all opportunities contained in labor and public activity of Soviet people. Among the causes determining the special significance of development of spiritual and intellectual forces of man, the scientific and technological revolution holds an exceptional place. On the other hand, it is itself a powerful stimulus for creativity.

NTR [scientific and technological revolution] organically combines revolutionary changes in science and technology, radical changes in the content of labor and qualitative transformations in the national economy. All this alters appreciable the role and place of man in industry and imposes special demands on the individual. At the present time, economic progress is impossible without development of such traits as the desire to find original solutions to industrial problems, readiness for rapid assimilation and use of new knowledge and information, ability to independently make the correct decision in difficult situations. In other words, we are referring to a change in economic thinking, a decisive breakdown of outdated stereotypes in economic psychology. This is how the question is posed today by the party. One should not fear something new, rather, one should search for it actively; one should not be governed by local, departmental interests, but by national ones; one should not be governed by immediate gain, but think about the future; one should not simply strive to save a ruble, but invest it in such a way as to have it yield 2 rubles of profit; one should not work for the sake of a handsome report, but for the sake of genuine results--these requirements are addressed not only to economic administrators and specialists, but to all workers, and they are dictated by the objective command of our times. Modern industry, as stated by comrade M. S. Gorbachev, is aimed at the initiatively thinking worker, who is highly organized, disciplined, educated

and armed with basically new technological sophistication (see "Zhivoye tvorchestvo naroda" [Living Creativity of the People], Moscow, 1984, p 23).

Intensification of industry, which is at the top of the party's economic policy, would be impossible without a concerned, initiative and creative attitude to the cause on the part of each worker at each workplace. Since modern man has increasing physical resources at his disposal at work (suffice it to state that there has been an almost 15-fold increase in capital-labor ratio from 1936 to 1983 in our country), since he is solving increasingly complicated production problems, his passiveness, lack of discipline and irresponsibility could be extremely detrimental to society. Let me illustrate this with an example: sample sociological studies have shown that almost 70% of all rejected products at several enterprises are produced expressly because of careless attitudes toward the job, as well as poor qualification of workers; up to 90% of all industrial accidents are attributable to their negligence.

Today, a sense of responsibility and self-discipline emerge as mandatory conditions, as an element of occupational training. However, as shown by sociological analysis, slightly more than half the workers studied have a highly developed sense of self-discipline. This trait should be developed to some extent or other in the rest. It must be stressed that socialistic labor discipline signifies not only conscientious performance by man of his immediate duties. It is closely linked with labor and social initiative, responsibility for the state of affairs in the group and society. In the book, "Nekotoryye vyvody iz pedagogicheskogo opyta" [Some Conclusions From Pedagogic Experience], A. S. Makarenko wrote: "Discipline is a profound political phenomenon, one could say it is how a citizen of the Soviet Union feels."

Modern industry is increasing the number of problem situations, and many of them cannot be resolved without "involvement" of moral factors. Questions of ecology, socioeconomic planning and interpersonal relations with the new forms of organization of labor and evaluation of labor performance and others require a certain level of moral awareness. Suffice it to state that almost one-fourth of the dissolved brigades that assumed a collective contract were dissolved primarily because of incompatibility of moral sets of workers. It is not by chance that, at the petroleum-extracting enterprises in Tyumen Oblast, the moral factor is ranked on a par with the professional level of specialists and it is rated at 9.2 on a 10-point scale.

The scientific and technological revolution also has a strong influence on the process of intellectualization of labor, as manifested by the increasing share and significance of mental work. With a low level of mechanization, the proportion of mental and physical labor is 20 to 80, with an average level it is 40 to 60 and with full mechanization and automation it is 90 to 10, i.e., scientific knowledge is transformed into a leading force of social production under conditions of NTR. Even now, more than 30% of the increase in national income is generated in our country by the rise in education and qualifications. Introduction of new equipment based on scientific achievements yielded more than half the entire increment in labor productivity under the current five-year plan, and it provided for a saving of 2.5 billion rubles

as a result of lowering production cost; it has helped save the labor of slightly less than half a million industrial workers.

NTR makes it imperative not merely for workers to have a high level of general education, but primarily occupational training. Even now, 280 occupations require secondary specialized technical education. A professionally educated individual adapts much faster to a job, constantly strives to improve himself and this means that he works more efficiently. The results of investigations have shown the same thing: the higher the general and professional education, the stronger work discipline usually is.

It is also remarkable that sociopolitical activity changes in proportion to the level of education: its increase constitutes about 10% on each of the educational levels (elementary, partial secondary, secondary, incomplete higher and higher). While, let us say, 19.7% of the people with elementary education are involved in sociopolitical work, among those with higher education this applies to 89.7%.

At the same time, it should be noted that the general rise of educational level also adds difficulties in the process of formation of an individual's spiritual world. For example, education sharpens an individual's critical perception of reality, which must be taken into consideration in ideological indoctrination work, constantly improving its quality. Moreover, sociologists have arrived at the conclusion that young people with general and specialized secondary education engaged primarily in physical labor often work unwillingly and purely perfunctorily. Secondary education is viewed as superfluous, and this affects the attitude toward work. An unused potential of knowledge is also detrimental to society and inhibits man's spiritual growth.

Change in proportion of rational and emotional elements in an individual's moral life is of special significance to development of the personality in the NTR era. The scientific and technological revolution is directly involved in forming rationalism and logical thinking; moreover, it demands such thinking. At the same time, the NTR does not contain factors that, per se, would have an equally powerful influence on the emotional side of an individual's spiritual world. For this reason, rational and logical elements in an individual, in his attitude toward reality are pushing the emotional factor more and more to the background, whether we want this or not.

Is this good or bad? There is no unequivocal answer. There are debates. Some say that the emotional factor is regressing and that is the way it should be; now is the time for "businesslike" people, so-called technocrats. Others are sounding the alarm that rationalism could lead to undesirable emancipation of thinking from feeling, that it could reduce the "passion of the soul" to cold reasoning.

Apparently, the question cannot be posed as either-or. It is necessary to strive for organic union of the emotional and rational in an individual's spiritual world. K. Marx stressed that the goal should be to form the individual "with all ... the wealth of his being ... manifold, profound in all his senses and perceptions...." (K. Marx and F. Engels, "Works," Vol 42, pp 122-123).

The danger to moral development of the individual is not an increase in share of the rational element, but retarded growth of the emotional factor in perception of the world and, as a result, impairment of the necessary harmony between the two. Studies pursued by sociologists have shown how serious can be the consequences of such dysharmony. Among people, particularly young people, working in the field of science and technology, there is often manifestation of utilitarianism in moral issues, which is emphasized by rationalism, calculation and strictly pragmatic evaluation of human relations. Emotional underdevelopment and moral deafness not only impoverish the spiritual world of the individual, but hinder his being a genuine creative force in the era of the scientific and technological revolution.

All this is referable to ideological indoctrination work, in which there is sometimes insufficient consideration of the impact of scientific and technological progress on an individual's spiritual world. The problems can be overcome and there are unlimited opportunities for this in our society. Such moral principles as patriotism, active position in life, high awareness of social duty, mutual help, collectivism and others remain firm in the temperament of an individual reared under socialism. It is important to continue to develop them, obtain a blend in the individual of political and civic maturity, high moral qualities with profound knowledge and broad-mindedness.

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## GENERAL

### HOW INNOVATIONS SHOULD BE HANDLED

Moscow SOVETSKAYA ROSSIYA in Russian 22 Mar 85 p 3

[Article by G. Chernikov, inventor, Moscow, under the rubric "Opinion":  
"Correction of Tactics"]

[Text] It is known that an author's certificate is issued only after an application for an invention is examined, which then becomes the property of the state. The innovator retains the rights of author of the innovation and subsequently receives a reward in the event his invention is produced.

Thus, we come to introduction. Who should display proper interest and initiative at this important stage? Who is in a position to objectively interpret and adapt for a practical purpose the technical development of the inventor? It is no secret that organizations that develop and introduce inventions are not always interested in them if the authors are outsiders.

The subjective approach to introduction of developments is a serious deterrent to solving important scientific-technical problems.

We think that the author should not be involved in realizing his own innovation. His job is to develop the invention and hand it over to the state. Introduction should be the job of the one to whom it will be of direct benefit. And for this to be expressly so, one should revise the existing system of incentives for inventions, which one cannot call flexible or progressive at the present time.

And how do we view the actual mechanism of introduction? This already depends on the innovation. If, for example, we are dealing with a small part, circuit or device, one person can be its introducer--an engineer, technician, designer... Having discovered a new development in a relevant collection of inventions, he makes calculations and adapts it, let us say, for a machine, in the development or operation of which he is involved. Thus, the engineer or technician becomes the author of the introduction and is rewarded in accordance with the obtained economic effect. In this example, everything happens as it would if a very promising innovative proposal had been conceived and introduced.

What is to be done with a major invention, new equipment or machine? It is obvious that one person could not handle this. Then, probably, there should

be a temporary union of leading enterprise specialists--designers, engineers, researchers. The number and composition of such introduction groups should be approved by enterprise management in each individual case. The author of the innovation may also become part of such a group.

In case work on introduction fails (one must take this into consideration) there should be agreement with management as to maximum amount of loss and how it is to be written off. Actually, implementation of large inventions involves a certain risk and some economic difficulties. Legal departments could elaborate a more detailed status for introduction groups.

If, however, we are dealing with introduction of an original invention that affects the interests of an entire sector, it is possible to establish a temporary firm for the duration of work with the innovation, providing it with the appropriate physical and financial resources. No doubt, in this case, there must be agreement in advance as to the means of distributing large deductions from the potential savings as a result of introduction.

Such a firm could probably be formed rapidly and efficiently at the base enterprise of the sector. There can be one criterion for implementation of this suggestion: the expenses for forming an appropriate department must be considerably lower than the effect of introduction. The innovation must be entirely advantageous to the state.

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## BIOGRAPHICAL INFORMATION

### BIOGRAPHIC SKETCH OF KHARAL D MARTOVICH KHAHERMAN, ESTONIAN SCIENTIST

Tallin SOVETSKAYA ESTONIYA in Russian 19 Dec 84 p 3

[Article by O. Renno, candidate of biological sciences under the rubric "Birthdays": "Always Pursuing a Creative Search"]

[Text] Today, the scientific community of this republic is celebrating the 80th birthday of one of our most prominent scientists, Professor Kharal d Martovich Khaberman, doctor of biological sciences and academician of the Estonian Academy of Sciences.

Our honoree has a long road behind him. He was born in 1904 to a Tallin worker family, and in his youth he already witnessed many revolutionary events and the most bitter class struggle, which undoubtedly played an important part in formation of his ideology. It was not easy for the son of a blue-collar worker to study at Tartu University, for he had to also earn his daily bread. In 1931, he graduated from the faculty of natural sciences and mathematics and received the diploma of a hydrobiologist. Two years later, he defended a dissertation in the same specialty and received the scientific degree of master. He actively combined his scientific work with participation in leftist circles in Tartu, and in October 1939 he became a member of the Estonian communist party.

During the days of the revolutionary events in June of 1940, Kharal d Khaberman was assigned the post of deputy minister of internal affairs of the republic under the new democratic government. In August 1940, he became business manager of the Council of People's Commissars of the young Soviet republic.

Kharal d Khaberman also held combat posts during the years of the war against the fascist invaders. He worked as editor in chief of Estonian radio broadcasts in Leningrad, then as permanent representative of ESSR in Moscow. In the fall of 1944, he returned to liberated Tartu, where he became pro-vice-chancellor of the university and devoted considerable effort and energy to restoration and adjustment of educational work in the republic's oldest VUZ.

After the Estonian Academy of Sciences was founded, Kharal d Martovich was elected as a corresponding member in it. The Institute of Biology (after 1954 the Institute of Zoology and Botany) was organized with his participation,

and he worked as its director for 31 years, a unique record among administrators of scientific institutions. In these years, the institute became a prestigious research center for many branches of biology expressly thanks to the fact that the scientist was directly involved in both training scientific personnel and developing subjects for investigations. He devoted much effort to reinforcement of the material base (he helped in the construction of the Vyrts"yarveskiy limnological and Pukhtuskiy ornithological stations, as well as several new institute laboratories) and he supported introduction of the latest scientific methods. In these three decades, the institute staff increased by six times and scientific output even more; 10 institute employees defended doctoral dissertations and more than 60 defended candidatorial ones. The honoree participated in many scientific and problem councils, as well as the council on defense of dissertations, and he did so most often in an administrative capacity. In 1951-1954, he was chairman of the Estonian Society of Naturalists and in 1954-1964, academician-secretary of a department in the Estonian Academy of Sciences. With all his enormous administrative activities, Kharal'd Khaberman is primarily a scientist: he has authored more than 120 scientific works dealing with entomology, hydrobiology, zoogeography and theory of evolution, including tens of monographs. He has delivered papers at many major scientific congresses and conferences, including international ones. The scientific degree of doctor of sciences was bestowed upon Kharal'd Khaberman (1950), as well as the title of professor (1955) and the title of Honored Scientist of ESSR (1964); he was elected active member of the Estonian Academy of Sciences (1954), honorary member of several scientific societies and the first honorary citizen of Tartu; numerous orders and medals, as well as honorary testimonials, were bestowed upon him.

Our honoree is well-known also as a public figure. He is known in this republic as an excellent lecturer and disseminator of scientific knowledge, the author of several philosophical essays, as well as ... poetry, stories and memoirs. Yes, such is the creative range of our honoree.

As we congratulate him on this remarkable day, let us wish him inexhaustible vigor and creativity for many years.

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